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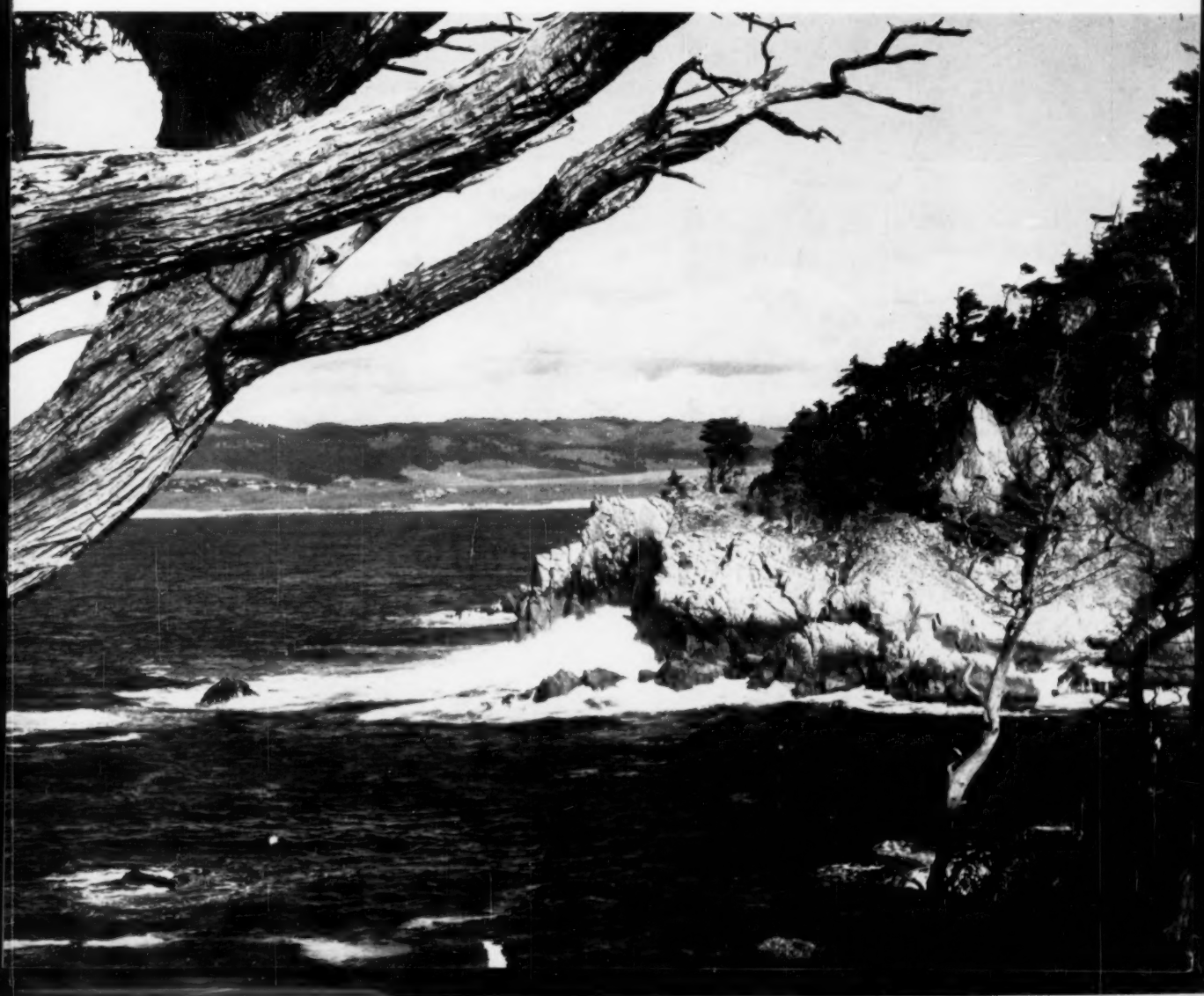

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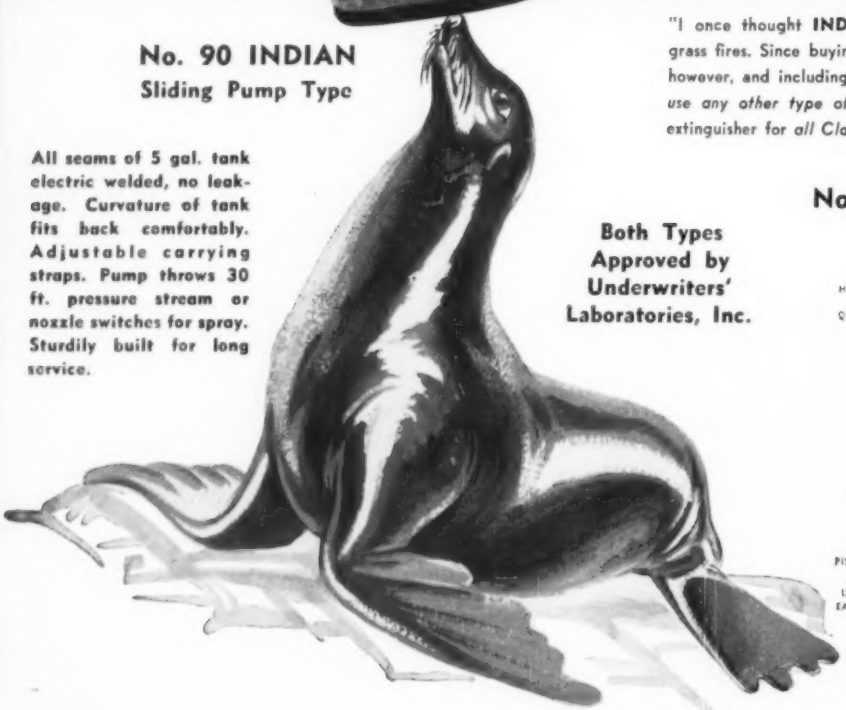

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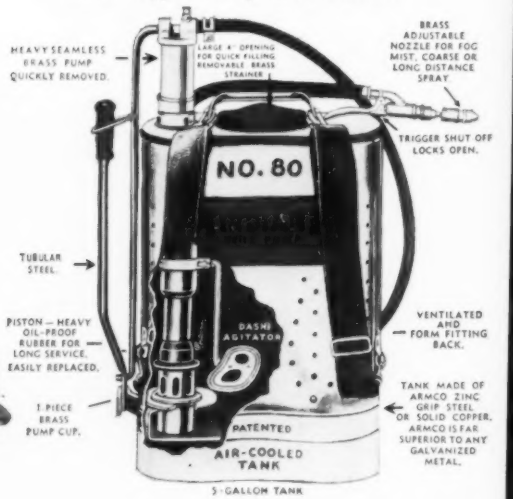
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CONTENTS

COVER: A portion of the California coastline at Pt. Lohos Reserve State Park, south of Carmel. This particular coastline was termed "the greatest meeting of land and water in the world" by the noted artist Francis McComas.

An Investment Opportunity Approach to Forestry Programming — Carl H. Stoltenberg 547

Results of Crop-Tree Thinning and Pruning in Northern Hardwood Saplings after Nineteen Years — D. F. Conover and R. A. Ralston 551

Forestry on Oregon State Highway Commission Lands — Lawrence C. Merriam, Jr. 558

The Effect of a Western Needle Fungus (Hypodermella medusa Dearn.) on Pines and Its Significance in Forest Management — Willis W. Wagener 561

Effect of Age on Rooting of Loblolly Pine Air-Layers — Robert G. McAlpine and L. W. R. Jackson 565

Timber Stand Maps, Plotless Cruising, and Business Machine Computation as Elements of a Timber Survey Method — Thomas J. Orr 567

White Pine in Western Washington — John W. Allen 573

Notes and Observations 577
A Device for Measuring Crown Diameters of Open-Grown Trees; Polyethylene Bag Packaging of Conifer Planting Stock in the Pacific Northwest; Loblolly Pine Seed Production and Seedling Crops in the Lower Coastal Plain of South Carolina.

Points of View 582
Forest Fire Control and Forestry Education; A Comment on Professional Methods.

Book Reviews 587
Fruit Key and Twig Key to Trees and Shrubs; Fruit Key to Northeastern Trees; Twig Key to the Deciduous Woody Plants of Eastern North America; Birds of Alaska; Poplars in Forestry and Land Use; The Ghost of North America; An Outline of Photogrammetry; George Perkins Marsh, Versatile Vermonter; Publications of Interest.

Current Literature 591

Society Affairs 592

Forestry News 616

Index to Advertisers 624

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An Investment-Opportunity Approach To Forestry Programming

Carl H. Stoltenberg

IN THE UNITED STATES, fewer than 5 million people own forest land. Yet more than 160 million others are concerned with how forest land is managed. More than ever before, the public, forest industries, conservation groups, and other organizations are vitally interested in the productivity of the other fellow's forest. Though their interests are not identical, most are concerned with getting the owner to practice "better forestry."

Most foresters are involved. We are all in there pitching—all trying to encourage owners to adopt better forest practices. But sometimes we don't make efficient use of our efforts. I believe some of this inefficiency is caused by failing to clearly specify our objectives, and some by accepting overly simplified and overly naive objectives.

My purpose in preparing this paper is to suggest a more workable definition of our goal than "good forestry." I wish to point out the need for new criteria to evaluate the opportunities any property offers for achieving this goal.

For simplicity my definition and discussion are restricted to forestry as a timber-producing enterprise. However, this restriction does not affect the validity of the concepts presented. To include multiple benefits would needlessly complicate the presentation and thus detract from the major concern of this paper.

THE AUTHOR is chief, Division of Forest Economics Research, Northeastern Forest Experiment Station, Forest Service, U. S. Dept. Agric., Upper Darby, Pa.

Many Interested in Owners' Management

Owner's objectives. — Individuals own forest land for a number of reasons, many of which are not related to timber. But as far as timber-growing is concerned, most owners would not object to adopting a forest practice if they really expected to reap the benefits, and if these benefits were large enough in relation to the costs involved.

But forestry costs differ greatly from one owner to the next because of different rates of time preference, different opportunities for using their time and money, and so forth. And there are similar differences in the values that owners place on the timber they can produce. But basically, owners of small forests are probably no different from any of the others who are interested in the management of their forests: owners too are interested (at least mildly) in timber production.

Usually there are several forest practices that would increase the productivity of an owner's woodland—several places the owner could productively put to use his available energies or capital. Although he may not recognize it, his problem is one of selecting which (if any) of the several measures he should adopt, in view of his own cost and prospective-income situation (*1*).

Industry's objectives.—The Tree Farm System and Tree-Farm-Family programs, forestry field days, forestry youth camps, Keep Green campaigns and similar efforts indicate the concern of timber-using industries for the management of non-industry owned forest land. Many companies hire foresters to work solely with these other landowners, helping them mark their timber, advising them on stand-improvement measures, and assisting them with tree planting.

Companies are convinced that, all things considered, this is one of the cheapest ways to increase the production of raw material for their mills. As costs of owning and managing their lands rise, companies will no doubt intensify their efforts to encourage others to grow timber. And, the more responsive landowners are to these company efforts, the more profitable it will be for a company to work with them.

Investment in nearby forests, even those owned by others, is only one of several processes that company management uses to meet its raw-material requirements. And actually this is not one but a whole array of ways. For, just as on company land, timber production from adjoining lands can be increased by a number of practices—planting, thinning, cull-tree removal, and control of species composition, to name a few. Company programs can logically be expected to stress those practices that will buy them the greatest production response per dollar of company cost.

Consumer's objectives. — Two other groups are vitally concerned with the management of forest properties they don't own—these

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are the present and future consumers of wood products. They are grouped this way because present consumers are competing with future consumers for wood products. The faster a given inventory is cut for present consumption, the lower prices will tend to be for current consumers and the higher they will be for future consumers. Conversely, the more slowly current resources are cut, the less future consumers will have to pay for forest products, other things being equal.

Thus from the consumer's standpoint, the decision is one of how much to consume today and how much tomorrow. Any forester would quickly add that this decision is modified by the amount of timber that can or will be grown before "tomorrow." However, we are also aware that it takes several decades of conscious forestry effort to greatly expand the amount of merchantable-sized timber available. So for periods as long as two to five decades, consumers are competing for a relatively fixed timber inventory.

Contemporary consumers have an advantage over future consumers in that the former are here —they can express their interests quite effectively in the market place and the political arena. For this reason, public agencies and conservation groups have tended to stress the interests of future consumers in many aspects of their forestry programs.

Thus the U. S. Forest Service's Copeland Report (*4*), Reappraisal (*5*), and Timber Resource Review (*6*) have strongly emphasized the needs of future consumers. The primary focus of these studies was on what the timber requirements of tomorrow's consumers would be, and relatively little stress was given to the next step—the most efficient means of producing these requirements. Nevertheless ,it is clear that the writers of each of these reports believed that future requirements can be met with less than the absolute maximum production from each and every acre.

So even in dealing with the objectives of present and fuure consumers, the problem is largely one of deciding where to put managerial efforts to achieve production goals.

Logically, it would seem that the best interests of all would be served if these goals were met by concentrating available effort and capital on those forestry measures and in those areas where increased production is greatest relative to costs.

Each Wants High Returns Relative to Cost

Each of these groups—forest landowners, industries, and consumers—have similar interests in forests. *First*, because forests produce something useful to people. Thus the focus is on people's needs and desires, not on the needs of forests. The condition of the forest is a means to an end, not the end itself.

Second, all groups have more than one way of meeting their needs. The landowner can obtain income from other sources; he can invest in any of several forestry practices; or he can buy other woodlands. The company can meet its requirements by obtaining wood from others or from its own woodlands, and the price of its products places a limit on what a company will pay for any amount of wood. Consumers can have different amounts of wood today and tomorrow, and indeed, if necessary, they can meet many of their consumption requirements by shifting to non-wood products. No group has absolute requirements for any specific forested property.

Third, all groups are interested in costs as well as in returns, especially costs they themselves must pay. Each is faced with a similar decision. Each must decide whether a prospective investment in a forestry practice is justified by the value of the resulting increased production. Of course each is interested in his own cost of obtaining the additional investment and his own valuation of the output, but the decisions are similar for all.

Thus the *fourth* similarity is that all are interested most in finding those particular woodlands and the associated forestry practices that will yield the greatest value of increased production relative to the forestry-practice cost. All are interested in the relative ranking of available forestry investment opportunities.

Goal: Make Soundest Investments First

As professional foresters we should agree that the interests of society as well as the interests of our employers will best be served if available effort and capital are directed into those investments that will yield the greatest return (all benefits considered) relative to the cost involved. Our objective should *not* be to "increase the productivity of every acre." This would be wasteful. Rather we should seek to take advantage of the best management opportunities first—those where the value of added yield relative to added cost is greatest.

Obvious? Perhaps so, but let's examine a few examples where actions have seemed to indicate otherwise.

Poor management vs. good investment opportunities. — Almost every forest-ownership study has in some way appraised the quality of forest management practiced by different classes of owners. Unfortunately, the results of these ratings have been used as arguments for action by public or private agencies to first deal with those owners who are practicing the poorest forestry. But is this where the best forestry-investment opportunities lie?

Dr. Lee James' study in Mississippi (*2*) classified cutting practices into six groupings, ranging from excellent ("cutting that brings into play the full productive capacity of the land") to destructive. Costs did not enter the analysis, nor did the presence or absence of opportunities to make any other sort of cut. It is unlikely that such a rating would be a very helpful guide to profitable investment opportunities.

In this same study, the quality

of fire protection was classified primarily on the basis of average annual burn, without regard to costs (or differences in benefits of control). Interestingly enough, although several properties might have the same average burn, if the owner of one had spent more for protection measures than the others, he received a *higher* management rating, despite the poorer results per dollar invested. Clearly this was a study of practices, of input intensity, not of investments or investment opportunities.

A study by Professor Yoho and others (*7*) compared cutting practices. He classified those practices "good" where logging "improved the stand" and "poor" where they caused the stand to "deteriorate." The cost and opportunities for doing otherwise were not appraised. Note that the criterion was to "improve *the stand*" (italics mine)—not to make profitable forestry investments that would benefit the owner or society.

Another valuable study was conducted by the TVA (*3*). In this study the two basic tests of the quality of management were whether the volume of "desirable growing stock" (1) increased or (2) decreased during the period. This system would rate an owner who did nothing higher than one who harvested all or part of his timber. Once again, here is a study that does not offer any basis for evaluating forestry-practice investment opportunities; it was not intended to do so.

Each of these studies was worthwhile. Each was carefully designed and conducted. But none of these management-rating systems is very helpful in identifying which owners have the stands that offer the best forestry-practice investment opportunities. And for planning efficient forestry programs—either public or private—the forester needs to know more about investment opportunities, and not simply whether owners are practicing "good forestry."

Other examples.—It is not hard to find other examples of programs or program proposals based on objectives other than investing effort and capital first where the returns relative to costs will be the greatest.

We all know of company land-purchase and forest-management programs that have paid little attention to the productive capacity of the site, programs based almost entirely on comparative costs per acre rather than costs per unit of product produced.

And does approval of a request for forestry A.C.P. payments depend on the value of the resulting timber output? Are the effects of site quality, species composition, and other factors considered? Say an owner requests funds for thinning a stand of red maple or some other low-value species. This owner has essentially the same chance of receiving funds as his neighbor who wants to cut defective beech that is overtopping black cherry or hard maple. Such requests are usually granted or rejected without considering site quality and similar factors.

State laws require strip-mining companies to plant trees on spoil banks—a large investment that promises little in return. But these same companies can denude productive forest land without consequence.

Do not we foresters frequently recommend spending large sums to plant "idle" acres to trees, while we ignore excellent opportunities for thinning investments in nearby plantations?

And do forestry programs always fully recognize differences in accessibility, markets, and similar factors that are important in determining the long-run returns per unit of forestry-practice cost?

Are state and federal agencies helping small landowners adopt practices that the agencies cannot afford to practice on their own land, even though investments on the public land might be more productive?

Now certainly where these conditions are found, practical and valid reasons frequently exist. Nevertheless, such conditions lower the contribution of the forestry profession to society and to employers of foresters. A major responsibility of the forester, both public and private, is that of investment analyst—directing forestry funds and effort into the most productive channels, within the limits of choice given him.

Have we foresters fully accepted this responsibility? If we used *all* of our knowledge and influence in the development of managerial policies and programs, I believe we could reduce the number of these "inefficiencies." And consequently the returns from forestry effort would be much greater.

Implications

An investment-rating system is needed.—If foresters want to be sure that management funds at their disposal are directed to the most productive uses, there is an obvious need for a practical means of rating forestry-practice investment opportunities. Actually, every practicing forester uses a rating system—though it may not be formalized beyond intuition. But if the scope of forestry-program planning is broad, covering very large areas, intuition must be replaced by an objective rating system. And that system must be one that can be applied consistently by foresters to a wide range of forest conditions.

For example, the U. S. Forest Service is concerned with an efficient national program of producing enough timber to meet the requirements of tomorrow's consumers. To be efficient, the program should be aimed at the most productive forestry investment opportunities. But where do these lie? In the South, the North, or the West? With owners of large tracts or small? In planting or in thinning? On what sites? In what timber types? Few if any foresters are familiar enough with *all* of these potential investment opportunities to array them by intuition in order of returns per unit of cost.

If an investment-rating system were available, and if it were applied on a sampling basis to stands and small ownerships throughout a wood-procurement territory, a

state, or the country, the cumulative results would be invaluable in appraising current and prospective public and private forestry programs.

Features of a useful system.—The *first* and most obvious requirement of any system designed to rate investment opportunities would be that it must consider costs and the value of anticipated returns; that is, it must measure both the investment and the expected return.

But what investment? Whose costs? And what returns? The information wanted will not be the same for all interested groups: each will have somewhat different costs; and each may place different values on the resulting increase in their quality and growth.

As an example of differences of cost, take the case of a company planning to hire a forester to encourage farmers to plant idle fields with pine—timber that the company expects to buy later for use in its mill. In evaluating this type of forestry investment, the company might logically consider only its own costs; for example, the time this forester will have to spend talking to farmers, perhaps the cost of a planting machine, the appropriate interest charges on these investments, and the stumpage price the company eventually expects to have to pay the farmer for the timber.

Farmers, on the other hand, would probably ignore these costs. They would be interested in the time they would have to spend planting, the cost (to them) of the planting stock, the appropriate interest charges, and other possible uses for this land.

Again, a public analysis might consider only the public's investment in the planting stock and the A.C.P. payments the owner received. Or the public analysis might take a broader view and consider the combined costs of everyone involved.

Thus the *second* requirement of a useful investment-rating system is this: it must provide the information needed by each group. Not all of it—because any workable system must be relatively simple—but the basic skeleton of facts to which each user can apply his cost and value figures.

Thus this skeleton of facts must classify stands into homogeneous forestry-practice *return* categories. For example, stands where thinning is feasible would be classified into several categories based on how much species composition is improved and by how much the rotation is shortened.

And the basic skeleton must also provide for classification of the same stands into homogeneous forestry-practice *cost* categories—using the thinning example, into several man-and-equipment-hour classes based on the thinning time required.

The framework must also provide information on non-stand conditions that will influence the costs of getting the job done. For instance, some forest owners are more willing than others to adopt specified forestry practices. This means costs of obtaining the cooperation of these owners will differ. We can probably recognize ownership classes for which these "encouragement costs" would be similar, just as we recognize biological-treatment cost classes.

There are two arguments against this approach: first, our lack of knowledge regarding the biological response of stands to forestry practices; second, the size of the job of quantifying current knowledge. Both arguments have merit—but not enough. For concerning the first argument, the best we can ever do is to act on the best information available—and at the same time concentrate research efforts on improving that information. And concerning the second, quantification of current information is a job long overdue.

Such information is desperately needed in training young foresters. With experience they will eventually be able to improve on this information. But can we afford to wait 20 years for them to gain this experience? Isn't the potential contribution of the profession much too great to wait for each one to gain all that experience?

Is our knowledge really that weak and the job of quantifying it really that large? Personally, I think not.

I believe the forestry profession has a great deal to offer forest industry, landowners, and consumers. And I am also convinced that we can materially increase that contribution by taking the steps necessary to make sure that, insofar as possible, available funds will be directed to those practices and those stands that will yield the greatest return per dollar spent.

Literature Cited

1. BARRACLOUGH, S. L., and E. M. GOULD, JR. 1955. Economic analysis of farm forest operating units. Harvard Forest Bul. 26. 145 pp. Petersham, Mass.
2. JAMES, L. M., W. P. HOFFMAN, and M. A. PAYNE. 1951. Private forest land ownership and management in central Mississippi. Miss. State Coll. Agric. Expt. Sta. Tech. Bul. 33. 38 pp.
3. TENNESSEE VALLEY AUTHORITY. 1956. Influence of woodland and owner characteristics on forest management. TVA Rpt. 217-56. 38 pp.
4. UNITED STATES FOREST SERVICE. 1933. A national plan for American Forestry Sen. Doc. 12, 73rd Cong., 1st Sess. 2 vols., 1,677 pp.
5. ———. 1948. Forests and national prosperity. U. S. Dept. Agric. Misc. Pub. 668. 99 pp.
6. ———. 1958. Timber resources for America's future. U. S. Forest Serv. Forest Resource Rpt. 14. 713 pp.
7. YOHO, J. G., L. M. JAMES, and D. N. QUINNEY. 1957. Private forest land ownership and management in the northern half of Michigan's lower peninsula. Mich. State Univ. Agric. Expt. Sta. Tech. Bul. 261. 56 pp.

Results of Crop-Tree Thinning and Pruning In Northern Hardwood Saplings After Nineteen Years

D. F. Conover and R. A. Ralston

IN THE WINTER of 1938-1939 a study of several intensities of crop-tree thinning was installed in northeastern Wisconsin by the Lake States Forest Experiment Station and the Nicolet National Forest. The problem in young hardwood stands then, just as it is now, was how to improve quality and composition. In 1953 about 40 percent (3½ million acres) of the northern hardwood type in the Lake States was in the seedling and sapling size classes (*4*); thus, the results of this study are applicable to a large forest acreage.

The importance of early weedings or cleanings in young northern hardwoods has been emphasized by Cline (*3*), Jensen (*9*), Jemison and Hepting (*7*), and Church (*2*). Frothingham (*6*) recommended removal of one-third to one-half of a sapling stand when it reached an average height of 8 to 10 feet. The supposition that noncommercial thinnings will pay has been only partly substantiated. This is due, in part, to the long-time nature of such research. Radical changes effected in species composition have been reported by Lutz and Cline (*10*). Church (*2*) noted a greatly increased diameter growth of selected trees.

Additional research will be needed to answer the most difficult question, namely, "when in the life of a hardwood stand should thinnings begin?" In the final analysis, noncommercial thinnings made at various times will have to be compared with early commercial thinnings for pulpwood and chemical wood[1] on the basis of operational costs and final yield of material of the desired quality.

Stoeckeler and Arbogast (*12*) summarized the first eight years' results of the study in northeastern Wisconsin. The present report deals with the 19-year remeasurement and the second thinning and pruning operations.

Establishment and Design of the Study

The stand chosen for thinning was an 11-year-old northern hardwood stand on a good site. There were 2,810 trees per acre of sugar maple, American elm, white ash, basswood, and other species in 1938. Of the total stand, an average of 139 trees per acre were holdovers from earlier logging with an average diameter of 3.6 inches, but ranging up to 12 inches d.b.h. The second-growth trees averaged 1.7 inches in diameter with dominants averaging 21 feet tall and 2.1 inches d.b.h.

In the winter of 1938-1939 twelve square ½-acre plots were established in a 3x4-plot rectangle. All low-quality, overtopping trees left after the earlier logging were girdled with an ax. Time required was 3.2 hours per acre or 6 minutes per tree girdled.

Next, 300 to 400 potential crop trees per acre were selected, paint-numbered, and measured. Preference was given dominant and codominant trees having the best form, stem quality, and vigor. To obtain better species representation, only 41 percent of the crop trees selected were sugar maple compared with 68 percent in the original stand, and the percentage composition of other species (Amer-

FIG. 1.—Stages of development in one stand. *Upper*, photo taken in fall 1938 before logging, *center*, spring 1939 immediately after removing all trees within a 5-foot radius of numbered crop trees, *lower*, stand as it appeared in fall 1955. Thinning radius was increased to 7 feet in 1946.

THE AUTHORS are research forester and forester, Lake States Forest Experiment Station, Forest Service, U. S. Department of Agriculture.

[1]Although present Lake States markets usually limit cutting to the sawlog-size class, expanding pulpwood and chemical wood markets will eventually make nearly all sizes of trees merchantable.

TABLE 1.—TIME REQUIRED TO THIN AND PRUNE

Treatment	Man-hours of thinning time per acre		Man-hours of pruning time per 1,000 trees	
	1938	1946[1]	1939	1946
Unthinned	—	—	30.1	36.4
Light thinning	10.0	18.3	22.2	34.6
Heavier thinning	24.8	17.3	26.8	34.5

[1]On both thinning treatments 1,100 trees per acre were cut; average d.b.h. was 2.0 inches.

TABLE 2.—VOLUME PER ACRE OF CROP AND NONCROP TREES IN ORIGINAL STAND AND 19 YEARS LATER, BY TREATMENTS[1]

Treatment	Original stand before logging[2]			Stand after 19 years					Change in 19 years		
		Basal			Basal	Volume				Basal	
	No. of trees	area, sq. ft.	Cu. ft. volume	No. of trees	area, sq. ft.	Cu. ft.	Cords	Bd. ft.	No. of trees	area, sq. ft.	Cu. ft. volume
Crop trees											
Unthinned	360	9.7	97.6	299	58.7	1064.0	6.4	581	−61	+49.0	+966.4
Light thinning	338	7.5	75.1	305	63.9	1218.5	6.7	780	−33	+56.4	+1143.4
Heavier thinning	327	8.0	68.0	319	79.6	1568.0	8.0	1313	−8	+71.6	+1500.0
Noncrop trees											
Unthinned	2591	35.0	423.5	879	66.4	1175.2	5.6	265	−1712	+31.4	+751.7
Light thinning	2182	32.9	394.6	588	44.7	792.2	3.7	91	−1594	+11.8	+397.6
Heavier thinning	2113	30.6	382.6	410	25.4	396.9	2.1	56	−1703	−5.2	+14.3
Crop plus noncrop trees											
Unthinned	2951	44.7	521.1	1178	125.1	2239.2	12.0	846	−1773	+80.4	+1718.1
Light thinning	2520	40.4	469.7	893	108.6	2010.7	10.4	871	−1627	+68.2	+1541.0
Heavier thinning	2440	38.6	450.6	729	105.0	1964.9	10.1	1369	−1711	+66.4	+1514.3

[1]Basal area and cubic foot volume are for trees 0.6 inch d.b.h. and up. Rough cords are to a 4.0-inch top d.i.b. and include volume in pole-size trees and tops of sawlog-size trees. Board foot volume is to an 8.0-inch top d.i.b.
[2]After wolf-tree removal.

ican elm, white ash, and basswood) was correspondingly increased among the crop trees.

Following the girdling operation and the measurement of the crop trees, three treatments were imposed on four plots each:

1. All trees within a 5-foot radius of the base of each crop tree were cut.
2. All trees within a 2½-foot radius of crop trees were cut.
3. No trees were cut.

In two of the four plots in each treatment the limbs of potential crop trees were pruned flush to the stem with a handsaw to one-half total tree height in 1939. The small amount of pruning time required (average—1.6 minutes per tree) reflects the fact that hardwood pruning commonly involves removal of only one or two limbs from selected trees in contrast with pine pruning where several whorls of five to six branches usually are cut.

In the winter of 1946-1947 the thinning radii were increased to seven feet on the plots previously cut to a 5-foot radius and to five feet on the 2½-foot radius plots. Trees pruned in 1939 were again pruned to one-half their total height. The man-hours expended on this and the earlier thinning and pruning operations are given in Table 1.

For purposes of comparison, a commercial thinning is presently being carried out on a comparable group of plots bordering on the original noncommercial thinning study. Cuts are being made on the new plots to provide varying residual stocking levels and to study the effects of an early commercial thinning on hardwood growth and quality development as compared with those obtained through earlier noncommercial thinnings.

Growth and Mortality

Volume growth.—By 1957 at stand age 30, many of the basswood, elm, and white ash crop trees had reached small sawlog size (Fig. 1). The second thinning had removed 1,100 trees or 360 cubic feet per acre from the treated plots, further increasing the growing space for crop trees.

That thinning has hastened growth of the residual trees is shown in Table 2. The 1957 board foot volume on the heaviest cut was more than 1½ times that of the check plots.

Of these totals, 96 percent of the board foot volume is in crop trees on the heaviest thinning compared to 69 percent on the check plot. Basal area and cubic foot volume show similar trends.

On the other hand, the 1957 total merchantable volume in cords is greatest on the unthinned plots. If board foot volume is converted to cords (2 cords per MBM) and added to pulpwood volume, we get:

Treatment	*Crop + noncrop trees*
Unthinned plots	13.7 cords per acre
Thinned to 5- and 7-foot radii	12.8 cords per acre
Thinned to 2½- and 5-foot radii	12.1 cords per acre

Although the total merchantable volume in cords is greatest on the unthinned plots, it is split nearly equally between noncrop (46 percent) and crop (54 percent) trees, while on the heavier thinning 86 percent of the volume is in crop trees. Thus, considerably more pulpwood volume in noncrop trees is now available for commercial thinning on unthinned plots than on the thinned plots.

Crop-tree mortality.—Rate of mortality of all species was reduced by the thinnings. About twice as many American elm, basswood, and sugar maple died on the control plots as on the thinned plots (Table 3). White ash mortality was decreased only on the heaviest thinning.

TABLE 3.—SIXTEEN-YEAR MORTALITY AMONG CROP TREES BY SPECIES AND TREATMENT, 1939-1954[1]

Species	Mortality by treatment		
	Unthinned	Light thinning	Heavier thinning
	Percent		
Sugar maple	10.1	5.2	1.5
White ash	9.7	8.5	4.4
American elm	12.6	6.0	3.4
Basswood	29.4	12.1	15.5

[1]Includes trees 0.6 inch d.b.h. and up.

The comparatively high basswood mortality on the thinned plots can be partially explained by competition within sprout clumps.

The treatment applied to basswood deviated from regular pro-

TABLE 4.—SIXTEEN-YEAR MORTALITY AMONG CROP TREES BY SPECIES, TREATMENT, AND 1938 DIAMETER CLASS, 1939-1954

Diameter class in 1938[1]	Unthinned		Light thinning		Heavier thinning	
	Mortality	Basis	Mortality	Basis	Mortality	Basis
Inches	*Percent*	*Trees*	*Percent*	*Trees*	*Percent*	*Trees*
			Sugar maple			
1	16	95	9	162	3	118
2	5	80	1	97	0	74
3	0	10	0	45	0	8
			White ash			
1	35	17	15	13	7	29
2	3	67	4	25	4	45
3	11	28	11	9	0	15
			American elm			
1	54	13	36	14	18	11
2	12	90	3	99	0	51
3	6	47	2	46	5	44
			Basswood			
1	82	11	27	11	13	23
2	33	27	11	9	3	32
3	4	26	6	32	35	20

[1]Trees over 3 inches d.b.h. are omitted from table. There were a few 4-inch trees in 1938, but none died except in basswood where 20 percent died on thinned plots compared to 33 percent on unthinned plots.

TABLE 5.—AVERAGE ANNUAL HEIGHT GROWTH IN 16 YEARS, BY SPECIES AND 1938 CROWN CLASS, 1939-1954

Species	Dominants		Codominants		Intermediates	
	Height growth	Basis	Height growth	Basis	Height growth	Basis
	Feet	*Trees*	*Feet*	*Trees*	*Feet*	*Trees*
American elm	1.75	16	1.31	44	1.19	13
White ash	1.56	12	1.55	27	1.72	6
Basswood	1.25	6	1.14	7	1.16	10
Sugar maple	1.35	9	1.06	69	.92	37

cedure in that it consisted of thinning each sprout clump to leave two or three of the best stems. This did not equal the prescribed thinning radii in most cases; therefore, competition was greater. However, basswood's relative intolerance to shade undoubtedly affected the results too.

Survival varied markedly with the initial (1938) size class of the trees. Table 4 shows that most of the crop tree mortality occurred in the 1-inch d.b.h. class.

Furthermore, losses in that size class were most pronounced in the unthinned plots. Mortality in these plots was greatest in basswood followed by American elm, white ash, and sugar maple, in that order.

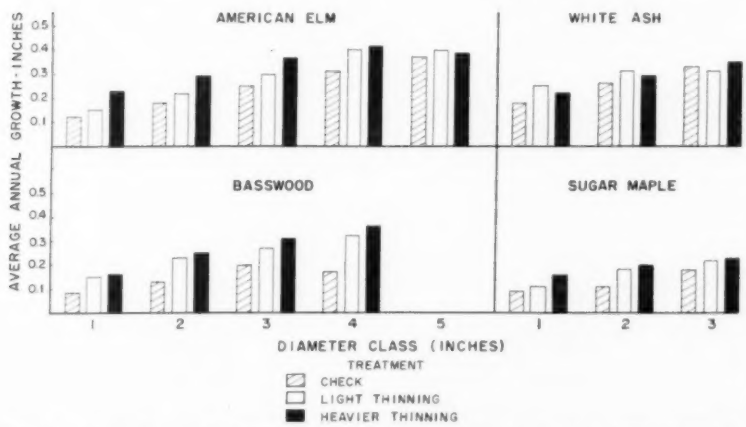


FIG. 2.—Average annual diameter growth of crop trees by species, 1938 diameter class, and treatment.

Height and diameter growth response.—Both height and diameter growth of crop trees were greater on thinned plots, but growth differed by species and size class. White ash made the fastest height growth, 1.6 feet per year, followed by American elm 1.4 feet, basswood 1.2 feet, and sugar maple 1.0 feet. Their total heights averaged 48.6 feet, 44.7 feet, 37.8 feet, and 36.6 feet respectively in 1954. Crop trees on the heaviest thinning made the best height growth—they grew 1.4 feet per year compared to 1.1 feet per year on the light thinning and 1.2 feet per year on unthinned plots.

The most consistent differences are apparent among crown classes and species (Table 5). Trees in the dominant and codominant crown classes made the best growth, except for white ash, which grew well regardless of its position in the crown canopy or the treatment applied.

Much the same is true of diameter growth. White ash grew rapidly in diameter without regard to treatment (Fig. 2). Elm, basswood, and sugar maple, on the other hand, responded well to thinning, especially the trees that were in the 1- to 3-inch-diameter classes in 1938. For example, in the 1-inch class, diameter growth on the widest thinning radius was double that of similar sized trees on the unthinned plots. Without regard to size class, white ash grew the fastest followed by elm, basswood, and sugar maple, in that order.

Success of crop trees selected in 1938.—Eight-year observations on crop trees in 1946 showed that 79 percent were rated as good or better than the remaining noncrop trees surrounding them (*12*). This rating was based on crown position, stem form, and soundness. Eight years later (after the second thinning) 62 percent were rated as good or better choices than surrounding trees. Poorest results were on the unthinned plots where only 52 percent were judged successful in 1954 and the best results—73 percent—were on the widest thinning radii.

The decline in success of crop trees is largely based on changes in crown position of trees that were codominant or intermediate in 1938 (Table 6).

The percentage of 1938 codominants or intermediates that were in the codominant and dominant crown classes by 1954 was increased by thinning for all species except white ash. Because of the latter species' rapid juvenile height growth, it attained dominance earlier than elm, basswood, or maple and therefore showed little or no effects of thinning from this aspect.

What happened to the selected crop trees that dropped out of the crown canopy? A closer look at one species, sugar maple, will serve to illustrate the effects of thinning on various crown classes (Fig. 3).

The mortality and changes in crown class indicate that caution should be exercised in selecting sugar maple crop trees at or below the codominant crown class. Of the 1938 intermediate sugar maple on the 5-foot and 7-foot thinning radius plots, only 14 percent were dominant or codominant in 1954 and 46 percent were either dead or suppressed by that time. To be sure, thinning improved chances of success, but much heavier thinnings than tested would be required to effect complete release and such treatment might seriously affect stem quality. Inherently slow growth, an unknown, may well be the cause of the poor response.

Thinnings generally improved the chances of codominants maintaining or bettering their crown position while dominants were little affected by treatment; that is, about 90 percent remained dominant or codominant regardless of treatment.

Quality Considerations

Although height and diameter growth were increased on the selected crop trees, changes often occurred in stem quality which affected the value of the products.

TABLE 6.—PERCENTAGE OF CROP TREES (IN THE SPECIFIED ORIGINAL CROWN CLASS) THAT WERE DOMINANT OR CODOMINANT AFTER 16 YEARS, 1939-1954[1]

Species	Unthinned		Light thinning		Heavier thinning	
		Basis		Basis		Basis
	Percent	*Trees*	*Percent*	*Trees*	*Percent*	*Trees*
			Dominant in 1938			
American elm	96	39	96	25	97	29
White ash	100	31	100	6	82	11
Basswood	61	23	95	21	80	10
Sugar maple	89	9	93	14	89	9
			Codominant in 1938			
American elm	35	99	59	108	71	77
White ash	75	72	89	27	76	62
Basswood	33	24	68	22	57	35
Sugar maple	12	106	39	134	57	134
			Intermediate in 1938			
American elm	11	28	23	30	21	14
White ash	30	10	46	13	18	17
Basswood	0	23	7	14	3	32
Sugar maple	3	73	8	82	14	58

[1]The following example will clarify reading of the table: In the unthinned area, 96 percent of 39 American elm trees that were dominant in 1938 were dominant or codominant 16 years later.

Pruning and limb-free length.—Pruning wounds healed rapidly in all species (Fig. 4), the majority requiring from two to five years for callusing over (*11*).

Natural pruning has also occurred at a rapid rate, particularly on the unthinned plots. Limb-free lengths of sugar maple and elm as influenced by thinning and pruning are shown in Table 7.

The trees of both species were pruned to one-half their total height or to about 10 feet in 1939 and to 14 or 15 feet in 1946.

Pruning unthinned sugar maple

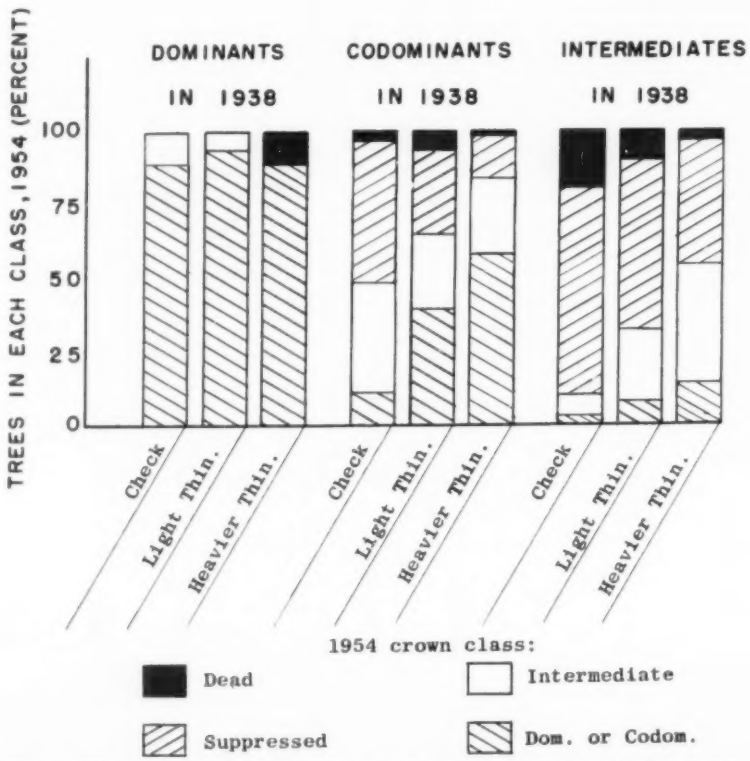


FIG. 3.—1954 crown class of sugar maples selected as crop trees in 1938. Stand was thinned in 1938 and again in 1946.

to this height did not increase limb-free length. On the thinned plots, however, natural pruning progressed more slowly and the pruned trees showed an average of 2 to 4 feet more clear length than unpruned trees.

American elm did not naturally prune itself as well as maple in the heavily stocked control plots. In fact, stand treatment had little effect on natural pruning. Pruned elm averaged 2 to 4 feet more limb-free length than unpruned trees regardless of stand density. This can be attributed to a tendency to fork and the persistence of the large branch stubs on the bole.

Artificial pruning of a greater clear length than one-half tree height would probably have resulted in an advantage over natural pruning so that the results cited here are limited in application.

Epicormic branching.—If gains in growth of crop trees result in early merchantability, but are accompanied by lowered yields of clear wood, thinnings will be of limited value. Jemison and Schumacher (*8*) studied old-growth hardwoods after logging and found differences in epicormic branching by species, log position, original stand volume, and volume cut. However, they concluded that the degrade, which occurred mostly in the top logs, was economically insignificant.

Eyre and Zillgitt (*5*) cited results in Upper Michigan cutting studies which showed a loss of clear length and resulting degrade in residual yellow birch and sugar maple after heavy logging. Much of the loss in clear lengths in sugar maple was attributed to development of puny branches that existed before logging. Early observations on the present study indicated that epicormic branching was increased by thinning and pruning but that most of the sprouts had disappeared within eight years after thinning.

A study made by Brinkman (*1*) of young 25- and 50-year-old oak stands in Iowa showed that there were more epicormic branches on trees in the lower crown classes and more on sprout clumps than on single stems. Branching was more common on heavy than on light cuttings.

Two growing seasons after the 1947 thinnings, which widened the radii around crop trees, a record was made of epicormic branching in the limb-free area of all crop-tree stems. Re-examination of the same portion of the stems in 1957 (Tables 8 and 9) shows the greatest differences to be related to: (1) Length of time since thinning and age of trees, (2) crown class, and (3) species. The least differences are between treatments.

Epicormic branching in 1948 occurred mostly on trees in the lower crown classes, and on these trees it decreased very little from 1948 to 1957. Dominant, codominant, and intermediate trees branched more often on the thinned plots than on the unthinned plots, but it is evident that epicormic branching is common without thinning. Stocking increased on all plots by about 30 square feet of basal area from 1948 to 1957, and this has probably been the reason for the decrease in epicormic branching in dominant and codominant trees during that period.

Field observations of the size and importance of the epicormic branching on crop trees reveal that the few epicormic branches occurring on the dominants and codominants are small and short lived, often coming and going within the same growing season. On suppressed trees, and to some ex-

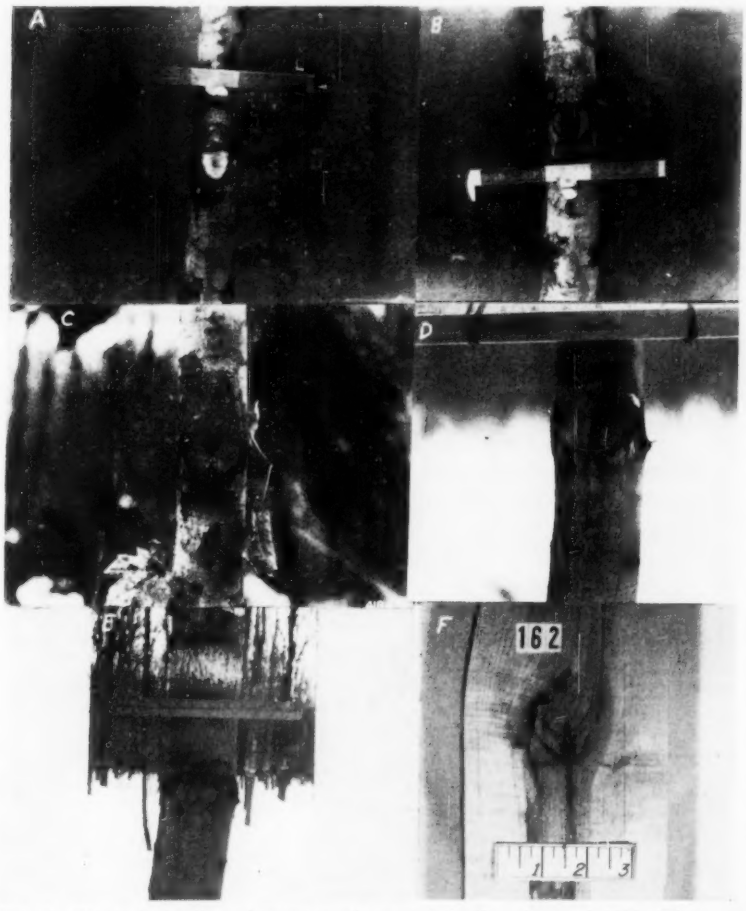


FIG. 4.—Stages in healing of sugar maple pruned in the winter of 1939. Pictures were taken: *A*, immediately after pruning; and *B*, one year, *C*, two years, *D*, seven years, and *E*, 16 years after pruning. *F* shows radial section through 17-year-old pruning scar.

tent on intermediates, epicormic branches often persist and become permanent; but trees of this crown position are of minor importance in an even-aged stand.

Sugar maple and American elm developed the most epicormic branches in all treatments; epicormic branching was less serious in basswood and white ash.

The data from this study indicate that artificial pruning had no apparent effect on the percentage of trees branching or on the number of epicormic branches on the stem area included. In 1948, 68 percent of the trees pruned the previous year had epicormic branches compared to 70 percent of the unpruned trees.

Development of low forks.—Forking causes a permanent reduction in merchantable length and is therefore a particularly important factor in rapidly growing young stands. Measurements of the height to fork were made in 1957 to investigate the relationship between forking and thinning. No previous records of forking were made, but Figure 5 shows that the percentage of sugar maple and American elm forking was greater in 1957 on thinned plots and increased with widening thinning radius. (Data on white ash were too meager to draw conclusions. None were collected on basswood, which seldom forks.)

Furthermore, a greater percentage of the crop trees now merchantable for pulpwood and sawlogs is forked on the thinned plots. For instance, 42 percent of the sugar maple over 4.6 inches d.b.h. were forked below 25 feet (1½ logs), while only one-half as many, 20 percent, were forked on the check plot. The same situation exists in elm—66 percent of the merchantable trees forked below 25 feet on the heavier thinning compared to 46 percent on the unthinned plots.

These factors again point to the need for artificial pruning early in the life of northern hardwood stands, particularly if thinnings or improvement cuttings are made. In this study the effect of releasing crop trees was not only to increase diameter growth and hasten merchantability, but also to decrease rate of natural pruning and encourage forking. Even on unthinned plots, however, forks or heavy limbs on otherwise potential crop trees should be pruned.

The feasibility of pruning limbs up to 2 inches in diameter was shown by a pruning wound dissection study (*11*) in the same stand.

TABLE 7.—LIMB-FREE LENGTH OF CROP TREES 16 YEARS AFTER PRUNING AND THINNING TREATMENTS, 1939-1954

Thinning treatment	Pruning treatment	Average clear length: Before treatment	Average clear length: After 16 years	Basis
		Feet		*Trees*
		Sugar maple		
Unthinned	Pruned	5.7	15.7	59
	Unpruned	5.9	16.1	23
Light thinning	Pruned	5.9	15.5	56
	Unpruned	5.5	11.9	39
Heavy thinning	Pruned	6.0	14.0	56
	Unpruned	6.1	12.0	48
		American elm		
Unthinned	Pruned	5.8	16.5	26
	Unpruned	5.9	12.3	51
Light thinning	Pruned	6.1	15.4	39
	Unpruned	5.7	13.2	30
Heavy thinning	Pruned	6.1	14.6	37
	Unpruned	6.3	12.1	36

Summary and Conclusions

Noncommercial crop tree thinnings were made in a sapling northern hardwood stand in 1938 and 1946. Thinning was done by removing all trees within two different fixed radii around selected crop trees. By 1957, after 16 years, board foot volume growth showed a definite advantage for the plots thinned to the widest crop tree thinning radius.

1. Board foot volume in the heaviest thinning averaged 1,369 board feet per acre compared to 846 board feet on the check plots.

2. The total volume in cords after 16 years was greatest on the unthinned plots. However, 54 percent of it was in nonecrop trees while 86 percent of the total volume on the heavier thinning was in crop trees.

3. Thinning increased diameter growth and decreased mortality of crop trees. Trees on the heavier thinning made the best height growth.

4. Dominant sugar maple remained dominant or codominant regardless of treatment. The chances of trees selected from the codominant and intermediate crown classes to become final crop trees were improved by thinning, but, even so, intermediate and suppressed trees were generally poor choices. On the heaviest thinning, 46 percent of the intermediates were dead or suppressed after 16 years.

5. Epicormic branching was general after the second pruning

TABLE 8.—EPICORMIC BRANCHING IN CROP TREES TWO AND NINE GROWING SEASONS AFTER THINNING, BY TREATMENT AND CROWN CLASS

Treatment	Percent with epicormic branching by crown class[1]: Dominant, Two years	Dominant, Nine years	Codominant, Two years	Codominant, Nine years	Intermediate, Two years	Intermediate, Nine years	Suppressed, Two years	Suppressed, Nine years
Unthinned	34	0	49	5	81	29	81	77
Light thinning	51	4	76	12	88	52	87	73
Heavier thinning	53	3	73	20	75	40	78	72

[1]Crown class shown is 1948 crown class two years after thinning.

TABLE 9.—EPICORMIC BRANCHING IN CROP TREES TWO AND NINE GROWING SEASONS AFTER TREATMENT, BY SPECIES

Species	Percent with epicormic branching: After two years	After nine years
Sugar maple	88.5	53.3
American elm	74.0	11.0
Basswood	29.7	14.7
White ash	13.3	5.0

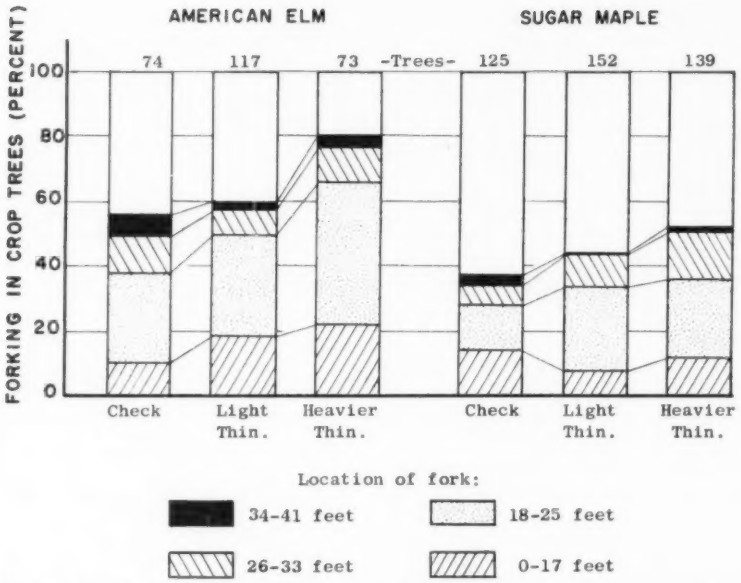


FIG. 5.—Percentage of sugar maple and American elm crop trees forking at various heights.

and thinning in 1946 on all species except white ash. Sprouting also occurred on the unthinned plots but was about a third less on dominant and codominant trees than on those in the unthinned plots. In 1957, after 16 years, most of the epicormic branches were gone except in intermediate and suppressed trees.

6. Forks below 25 feet were much more frequent in the thinned plots. In the heavier thinning 65 percent of the elm forked below that height compared to 38 percent on the check plots.

It is too early to evaluate fully the long-term results of either the increased growth of selected crop trees stimulated by thinning or the negative effects on quality. Comparisons with early commercial thinnings recently installed will provide part of the answer. However, it is evident that great care is necessary in marking young stands in the developmental stages because of considerations such as forking, natural pruning, epicormic branching, and growth response of trees of different species and size classes.

Literature Cited

1. BRINKMAN, K. A. 1955. Epicormic branching on oaks in sprout stands. U. S. Forest Serv., Central States Forest Expt. Sta. Tech. Paper 146, 8 pp.
2. CHURCH, T. W., JR. 1955. Weeding—an effective treatment for stimulating growth of northern hardwoods. Jour. Forestry 53:717-719.
3. CLINE, A. C. 1929. Forest weeding. Mass. Forestry Assoc. and Harvard Forest, 19 pp.
4. CUNNINGHAM, R. N., *et al.* 1956. Lake States timber resources U. S. Forest Serv., Lake States Forest Expt. Sta., Sta. Paper 37, 31 pp.
5. EYRE, F. H., and W. M. ZILLGITT. 1953. Partial cuttings in northern hardwoods of the Lake States. U. S. Dept. Agric. Tech. Bul. 1076, 24 pp.
6. FROTHINGHAM, E. H. 1915. The northern hardwood forest: Its composition, growth, and management. U. S. Dept. Agric. Bul. 285, 80 pp.
7. JEMISON, G. M., and G. H. HEPTING. 1949. Timber stand improvement in the southern Appalachian region. U. S. Dept. Agric. Misc. Pub. 693, 80 pp.
8. ———— and F. X. SCHUMACHER. 1948. Epicormic branching in old-growth Appalachian hardwoods. Jour. Forestry 46:252-255.
9. JENSEN, V. S. 1935. Suggestions for weeding in northern hardwoods. U. S. Forest Serv., Northeastern Forest Expt. Sta. Occas. Paper 3, 11 pp.
10. LUTZ, R. J., and A. C. CLINE. 1947. Results of first 30 years of experimentation in silviculture in the varvard Forest, 1908-1938. Part 1. Conversion of stands of old field origin by various methods of cutting and subsequent cultural treatments. Harvard Forest Bul. 23, 182 pp.
11. SKILLING, D. D. 1958. Wound healing and defects following northern hardwood pruning. Jour. Forestry 56:19-22.
12. STOECKELER, J. H., and C. F. ARBOGAST. 1947. Thinning and pruning in young second-growth hardwoods in northeastern Wisconsin. Soc. Amer. Foresters Proc. 1947:328-346.

Carl T. Thoresen (1910-1959)

Carl T. Thoresen, forester, Tennessee Valley Authority, died at St. Mary's Hospital, Knoxville, Tenn., April 24. He was 48 years old.

Mr. Thoresen was born in Pequaming, Mich., May 13, 1910. He attended high school at L'Anse, Mich., and graduated from Michigan State University with a B.S. degree in forestry in 1933.

He worked on the Pisgah National Forest until 1935 when he joined the Tennessee Valley Authority. For the past five years he had been project leader of a cooperative forest development project in Cumberland and Morgan Counties, Tenn.

Forestry on Oregon State Highway Commission Lands

Lawrence C. Merriam, Jr.

IN OREGON the State Highway Department and State Parks Division both are responsible to the State Highway Commission. Montana is apparently the only other state with a similar arrangement in which the directors of the highway program also control the activities in the state parks.

Nature of Highway Commission Forest Lands

In 1956 Oregon state park lands totalled some 57,136 acres in 162 different tracts (*4*), of which all but 17 tracts were forested to some extent. In addition to this the highway commission is responsible for 791 special sites, including quarries, stock piles, borrow areas, and miscellaneous sites. Some of these are timbered. Also under commission control are a great number of forested excess right-of-way properties purchased in connection with highway construction.

Park lands in Oregon are acquired for the culture and preservation of trees native to the state and for the preservation of scenic places and objects of attraction adjacent to or in close proximity to state highways (*3*). These lands are for the use and enjoyment of the general public, and natural forest conditions are maintained wherever possible. However, dead and down timber and hazardous trees are sold in small salvage sales where such removal does not impair park values to a greater extent than the benefits gained (*5*). Income from timber sales is always incidental to value preservation.

Park lands are of three types: (1) State highway parks range in size up to over 8,000 acres and are usually well-developed for picnic and/or overnight camping use. These areas usually preserve some outstanding scenic feature and often contain large stands of commercial forest types. (2) State highway waysides usually consist of small roadside use developments, such as picnic areas or narrow strips of forest land along state highways. (3) State highway timber preserves are roadside strips of Oregon myrtle (*Umbellularia californica* [Hook. and Arn.] Nutt.) preserved in unusual natural settings in southwestern Oregon.

Highway lands are acquired primarily for the construction of public roads or for the purpose of obtaining materials to be used in highway construction. Occasionally in the acquisition of land for highway rights-of-way it becomes necessary to acquire additional land (beyond immediate highway needs) where no direct access to such land is available or will be allowed after construction, and where the cost of acquisition is less than the cost of providing special access. Such excess right-of-way tracts often contain stands of commercial timber. In 1956, the State of Oregon through its State Highway Commission owned 791 special site tracts that had been acquired over the years for quarry, gravel, stockpile, and miscellaneous purposes. Forty-six of these supported merchantable timber stands and 152 contain scattered trees. These tracts range in size from 1 to over 100 acres.

After adequate provision for roadside beautification and use is made, merchantable timber is sometimes sold by competitive bidding.

In general, commercial forest species found in park and highway lands west of the Cascade Mountains include Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco), western hemlock (*Tsuga heterophylla* [Rafn.] Sargent), western red cedar (*Thuja plilcata*, Donn.),

THE AUTHOR is the senior forester with the Oregon State Highway Department, Salem.

FIG. 1.—State Highway Park along Columbia River Highway (US 30), Wasco County, Ore., showing park stand of ponderosa pine and some Douglas-fir.

FIG. 2.—Typical State Highway Wayside along the Sunset Highway, Columbia County, Ore., Tillamook Burn area. Windthrow is a problem. Stumps of past blowdown on right.

grand fir (*Abies grandis*, Lind.), and Sitka spruce (*Picea sitchensis*, [Bong.] Carr.). East of the Cascade Range commercial trees found on highway commission lands include ponderosa pine (*Pinus ponderosa*, Dougl.), western larch (*Larix occidentalis*, Nutt.), lodge pole pine (*Pinus contorta*, Dougl.), true firs (*Abies* spp.) and Engelmann spruce (*Picea engelmanni*, [Parry] Engelm.).

Management Problems

The problem of forest management of park and general highway lands is complicated by the fact that these lands include a great many tracts, many of small size, widely separated and spread over much of the state. They are often odd shaped (e.g., in narrow strips or small wedge-shaped pieces on inaccessible hillsides) to conform to the alignment of the adjoining highway.

Fire protection is a major consideration, particularly on park lands where there is heavy public use or where highway commission lands adjoin logged areas with slash accumulations. Oregon state park lands receive fire protection coverage from the various fire protection districts of the Oregon State Board of Forestry, for which annual per acre assessments are paid. Forest insects and diseases present difficulties on these lands requiring special studies by the highway foresters. Sometimes sanitation salvage cutting is necessary to curtail the spread of infestation. Timber windthrown by winter storms occasionally is a problem and often calls for salvage operations.

Timber trespass is a constant threat on lands whose boundaries are not well marked, and the apprehension of violators is often difficult if the cutting is not observed shortly after its occurrence. The location of power and telephone lines along forested highways and through forested park areas creates certain difficulties with regard to hazard and line tree removal, and the general problem of snag and hazard tree felling is always present on forest lands where public use and road travel are so important.

Often the snag-felling and hazard tree removal is done as a part of a salvage timber sale. Timber sale management on these lands requires special treatment in order to preserve roadside beauty and park values. On cutover lands and on some salvage areas tree planting is done to assure adequate growing stock and to restore the natural setting.

On forested park lands heavy public use, especially on shallow soils and in areas supporting shallow-rooted species, creates a forest problem whose solution requires much thought and often new lands (*1*). This points to the need for pre-development study of these park areas and an inventory of highway commission forest lands to discover future use areas or "reserve use areas."

Highway Foresters' Activities

New lands are constantly acquired for highway rights-of-way and park expansion. Many of these lands are forested and it is the function of the two foresters employed by the highway commission to appraise the timber value involved. In addition to this, these foresters work on the problems mentioned above.

In the matter of timber trespass, arrangements have been made with the Oregon State Board of Forestry and with state parks division field employees for notification as to logging operations adjoining state park lands. Contacts by the foresters with logging operators have been an aid in reducing timber trespass. Where trespass has occurred the foresters have estimated damage and contacted the violators as soon as possible after the cutting has taken place and a signed statement of interest has been obtained. This latter procedure has served to prevent recurrence of trespass and to aid in damage settlement.

The marking of boundary lines by the park survey crew has also been a great help in this work.

Where trees have shown signs of poor vigor or have died in park use areas, foresters have made studies as to the cause and prevention of future damage. Many times it has been difficult to maintain the vigor of the forest stand under continued heavy use.

Insect and disease problems often have been associated with the condition of heavy public use. Salvage logging operations followed by planting of native forest trees have in some cases served to control these problems as well as the problem of windthrown and fire-killed timber.

In the sale of salvage timber on park lands or the sale of any timber on highway commission lands, every effort has been made to protect the residual stand from damage and to insure adequate clean-up of logging debris. This has required the writing of very strict timber sales agreements calling for such things as: cutting only marked trees and operating only within designated areas; stump height of 12 inches or less; use of small tractors (Caterpillar D-4 or smaller); use of mobile loading equipment; landings and skid roads only in specified locations; piling and burning of all slash in small piles; felling of all snags on the sale area; logging to be done when soil disturbance is at a minimum. Adequate public liability and property damage insurance and the posting of a sizeable performance bond have also been required. The operator has been required to make special provision for the safety of park users and highway travellers. Close supervision by the foresters has aided in obtaining conformance with contract provisions and state forest laws.

In some cases, however, it has been found wise to have trees felled, yarded and decked by state park personnel. The logs then have been sold in the deck in a cleared area where possible loading damage has been at a minimum. (Table I lists salvage timber sales on state park land and timber sales on highway rights-of-way and special site lands from 1954 through 1957.)

In the matter of forest fire protection, arrangements with the Oregon State Board of Forestry have been the major effort on state park lands. However, snag-felling projects have been carried out on several tracts and many more are planned for the future. In addition, cooperative agreements on fire road construction and usage with neighboring landowners have been helpful.

In the future, with aid of data obtained in making a proposed inventory and check of the forest lands of the Oregon State Highway Commission, information should be available on fire hazards, road locations, water sources, topographic features and the nature of the forest stands. This should be of help in appraising the protection problem. Also concerned field personnel should be trained in fire prevention and suppression methods, and where needed, equipment should be made available for their use.

As far as state park lands are concerned, a more detailed study of ecological relationships prior to development in forest areas should be made. This should aid in reducing the problems of tree damage due to over-use.

Other State Activities

In order to determine what was being done in other states in the field of park and highway forestry, inquiries were sent by the author (1957) to all known state highway and state park organizations requesting information on the employment of foresters and the management of forest lands by these departments. Letters were sent to 48 highway organizations and replies were received from 37 of them. State park letters were sent to 40 states having park departments and 27 organizations replied.

Replies indicated that in most states very little is done in the field of highway forestry. What work is done is often performed by the state forestry organizations. State park replies revealed that in many states the parks organizations are joined with the state forestry organizations in a conservation department, and in others agreements are made with the forestry departments for professional forestry advice. Apparently only in New York and California are foresters employed by state park organizations primarily for forestry work (*2*). However, with the great expansion of highway programs throughout the United States and the rapid development and increasing popularity of state parks, it seems that there may well be a future need for the services of foresters in state highway and park work.

TABLE 1.—TIMBER SALES ON OREGON STATE HIGHWAY COMMISSION LANDS—1954-1957

Year	State park salvage sales	R/W and special site lands timber sales	Total sales	Total revenue
1954	7	2	9	$43,999
1955	2	4	6	65,035
1956	7	1	8	29,963
1957	6	2	8	5,825
Totals	22 Sales	9 Sales	31 Sales	$144,822

Summary

Oregon and Montana apparently are the only states in which the state park and highway organizations are combined under the state highway commission. Of 162 different state park tracts in Oregon, all but 17 are forested. In addition, the highway commission is responsible for a large acreage of timbered excess right-of-way land and special sites. Park lands are acquired primarily for public use and enjoyment and natural forest conditions are maintained wherever possible. Right-of-way and special site lands are acquired for highway construction purposes.

Forest management problems on these lands include fire protection, timber trespass, snag and hazard tree felling, salvage timber sales, heavy public use on park forest lands, and the acquisition of lands for highway and park purposes. Two foresters are employed by the Oregon State Highway Commission to handle these problems. An inventory of all commission forest lands is needed, as are improved fire protection procedures and predevelopment studies of forested park use lands.

A 1957 check of forestry activities in other state highway and park departments indicated that apparently only in the New York and California park divisions are foresters hired primarily for forestry work. However, it is felt that the expansion of highway and park programs in the United States may develop an expanded need for the services of foresters.

Literature Cited

1. MEINICKE, E. P. 1932. A camp ground policy. Ogden, U. S. Forest Service. 16 pp.
2. MERRIAM, LAWRENCE C., JR. 1958. Forest management procedures for the lands of the Oregon State Highway Commission. Master's thesis. Corvallis, Oregon State College.
3. GOVERNOR'S STATE PARK ADVISORY COMMITTEE. 1956. 1955-56 report and recomendations on Oregon State Parks. Salem. 77 pp.
4. OREGON STATE HIGHWAY COMMISSION, PARKS DIVISION. 1956. Annual report for 1956. Salem. 61 pp.
5. ————. 1956. Oregon state park policy and park regulations resolution. Salem. 6 pp.

The Effect of a Western Needle Fungus (Hypodermella medusa Dearn.) on Pines and Its Significance in Forest Management

Willis W. Wagener

FORESTERS in parts of the western United States are sometimes perplexed over scattered pines that show a greenish-white fading of the older foliage in the spring or early summer, the color gradually darkening to brownish shades as the season progresses. What causes the fading? Are the pines doomed or made more susceptible to attack by forest pests? The uncertainties have now been largely resolved. The fungus associated with this fading has not proved to be a major menace though it does cause reduced growth on poor sites.

The fungus that develops from the faded needles was described by Dearness (*2*) as *Hypodermella medusa* from specimens collected on *Pinus jeffreyi* Grev. & Balf. near Cisco, Placer County, California, and on *P. ponderosa* Laws. in Colorado. Darker (*1*) lists it from Colorado on *P. contorta* Dougl. and *P. ponderosa* and on the latter host and *P. jeffreyi* in California. Observations by the writer and collections in the herbarium of the Pacific Northwest Forest and Range Experiment Station indicate that *H. medusa* is probably rather widely distributed in the ponderosa pine forests east of the Cascades in Washington, Oregon, and northern California but is prevalent only in limited areas.

Disease Characteristics

The disease characteristically occurs in relatively open pure pine stands and tends to be most pronounced on medium to poor sites low in soil moisture. As noted by Shope (*7*) in Colorado, severity of infection varies greatly on individual trees and these occur interspersed among others showing no evidence of the disease. Affected foliage can occasionally be found on very thrifty young trees, particularly of Jeffrey pine, but on such trees only the oldest, physiologically less active needles are attacked —needles which would ordinarily be shed naturally within another year or two. On these thrifty trees, diseased needles tend to hang on for a longer time after death than normal ones, giving a bearded appearance to the twigs and upper main stem. Crowns of many older trees that have apparently been affected by the disease throughout their life show an abnormal bushiness, with more but thinner twigs than normal. Others that have probably been affected equally long show no tendency toward bushiness.

In early stages the fading is sometimes confused with fading from bark beetle attack but the two are readily distinguishable: that from the disease is confined to the older foliage; fading from bark beetle attack affects the needles of all ages. The disease is also easily distinguished from that caused by the needle fungus, *Elytroderma deformans* (Weir) Darker, by the deep red color in late spring of foliage attacked by *E. deformans* (*5*).

The hysterothecia, or fruit-bodies, of the fungus appear on affected needles in the spring as elongate blackish raised blister-like areas one-third to one-half the width of the needle and of variable length (Fig. 1). They slightly resemble mature scale bodies of the black pine-leaf scale (*Nuculaspis californica* [Coleman]) but are readily distinguishable from this scale. The fruit-bodies are found on greenish straw-colored zones, lighter in color than the remaining dead portions of the needle and commonly occupying one-fifth to one-third of the needle length, although at times extending to almost the full length. These zones may be located on any portion of a needle but are found more commonly near the base than elsewhere. Ascospores within the hy-

FIG. 1.—Fruit-bodies (hysterothecia) of *Hypodermella medusa* on foliage of *Pinus ponderosa*.

THE AUTHOR is on the staff of the Pacific Southwest Forest and Range Expt. Sta., Forest Service, U. S. Dept. Agric., Berkeley, Calif.

TABLE 1.—PERIODIC GROWTH INCREMENTS OF PAIRED PONDEROSA PINES, ONE GROUP INFECTED AND THE OTHER UNINFECTED WITH *Hypodermella medusa*, SHARP MOUNTAIN AREA, CALIFORNIA

Item	Mean radial growth increment		
	1875-1884	1915-1924	Reduction
	Inches	*Inches*	*Percent*
Infected trees	0.445	0.139	68.8
Uninfected trees	0.485	0.347	28.5
Percent difference in reduction in 40 years			40.3[1]

[1]When adjusted for initial growth rates (1875-1884) the difference in growth between the infected and uninfected trees was significant at the 1 percent level.

sterothecia mature chiefly in June and are discharged during the summer or fall.

In severe infections the entire needle complement for a given season may be killed, but more commonly infection is less complete and some of the needles remain green. In the Pacific Coast states most affected needles are 3 or more years old at time of fading. Occasionally fading needles only 2 years old are found. However, Shope (*7*) records diseased trees of the Rocky Mountain form of ponderosa pine near Allenspark, Colorado, on which, at the end of August, only needles of that season were green and healthy. Those of the preceding year were dead and bore mature hysterothecia of the fungus. No older needles were present.

Although the fungus was collected in California as early as 1913 it attracted no attention as a forest disease until 1925, when L. F. Kellogg of the U. S. Forest Service, Shasta National Forest, reported pronounced fading of foliage on ponderosa pines on an area near Sharp Mountain.[1] When examined on May 1, 1925, the fading foliage was very conspicuous on affected trees. Characteristically these trees were intermingled with others showing little or no evidence of the disease. A few trees were dead; others were in very poor condition, with only small tufts of short needles remaining alive at the tips of twigs, indicating that the disease had been present in the stand for some years.

The effect in 1925 was evidently enhanced by the severe drought conditions that had prevailed from September 1923 to October 1924, the most pronounced of the present century in northern California. At McCloud, California, the nearest station for which longtime precipitation records were available, total rainfall for the period was only 10.89 inches as compared with an annual mean of about 46 inches. Around Sharp Mountain mean annual precipitation is about 18 inches, suggesting that during the drought period the area affected by the disease may have received not more than 4 to 5 inches of precipitation. The site was poor and the soil apparently not over 2-½ to 3 feet deep over basaltic lava. Under these conditions the growth of all trees was relatively slow, especially after about 100 years of age.

Effect on Growth on Poor Site

There were strong indications that severely affected trees on the Sharp Mountain area had suffered from the disease for many years. Accordingly, an attempt was made to find if there was any evidence of a retardation in growth in such trees as compared with those free or nearly free of the disease. Thirty-two pines were picked in pairs, one member of each showing severe infection and the other none or only a slight amount on lower, physiologically retarded branches. From the lack of symptoms on the latter members of the pairs it was assumed that they had always been disease-free or nearly so. Subsequent observations elsewhere confirmed that resistance to the disease is a stable characteristic and that the assumption was undoubtedly valid. In other respects the members of each pair were as nearly alike as could be judged from appearance and were growing in the vicinity of each other under similar environmental conditions. Increment cores were extracted from the chosen trees at breast height and the radial growth on them measured under the microscope with the aid of a core-measuring device.

Mean radial growth for trees of the two groups was determined for the decade 1915-1924, as compared with growth of the same trees for the period 1875-1884. One pair of trees was omitted because the members were not old enough to yield breast-high growth rings for the earlier decade.

Infected trees showed a 40 percent greater reduction in growth than the uninfected group (Table 1). Since the trees appeared to be comparable in other respects, this growth difference must have been chiefly an effect of the Hypodermella attacks.

Seasonal Fluctuation in Incidence

In 1940 the disease was very noticeable on scattered ponderosa and Jeffrey pines in a few compartments of Blacks Mountain Experiment Station, in northeastern California. Forest entomologists had under way there at the time a practical test of criteria developed for rating the susceptibility of ponderosa and Jeffrey pines to bark beetle attack (*4, 6*). They were uncertain how the needle disease might affect bark beetle risk in the trees affected and desired information on this question.

To obtain information on possible insect risk effects and on the comparative severity of Hypodermella attack in different seasons, observations were begun in 1940 on 151 affected pines in 20-acre plots within four compartments of the Experimental Forest. The diseased trees were chiefly *P. ponderosa* ranging in d.b.h. from 4 to 42 inches. The proportion of affected trees in the stand varied somewhat among plots but in no case exceeded 1 in 12. Reexaminations were made annually through 1944, in 1946 and 1948, and for trees in two out of four compartments in 1951.

Infection was judged visually

[1]Now a part of the Klamath National Forest.

and rated in four primary degrees from none to heavy and their intermediates. Crowns were divided visually into lower, mid, and upper parts and each part rated separately. To minimize differences in interpretation, all ratings were made by the same person for all years in which the trees were rated. The trees were also rated for general appearance at the beginning and end of the rating period. No unaffected trees were included in the detailed observations and ratings, but in the course of the reexaminations infection was noted to be confined always to trees that had shown infection in 1940. No others were noted that had subsequently developed the disease.

For a comparison of infection by years, the original ratings in symbols have been converted into numerical equivalents on a scale of 0-6 for each third of the crown. Under this system the maximum possible rating for a tree would be 18, signifying heavy infection in all three postions of the crown: lower, mid, and upper. Because the size and age of a tree appeared to make a difference in the distribution of infected foliage over the crown, the sample trees are divided into two groups for comparison of infection by years, one group consisting of saplings and poles under 12 inches d.b.h. and the other of trees 12 inches and over d.b.h. Mean numerical ratings for the years in which examinations were made are given in Table 2.

An alternation of years of relatively heavy infection with years in which the disease was either light or absent is evident for the period 1940-1944 inclusive, in which ratings were made annually. That this pattern of alternation did not persist is indicated by the relatively low infection level in 1948 and the moderately high level in 1951.

When heavy infection is the result of an increased physiological stress in the host, such as may be induced by drought, more than a normal complement of the older needles succumb. This leaves fewer susceptible needles than average for the following season and the disease incidence then is likely to be low. Conversely a season in which infection is lacking or negligible increases the needle complement subject to attack the following season.

Relation to Precipitation

We have already noted that the pronounced infection near Sharp Mountain in 1925 followed a year of extreme drought. It is logical to expect that an organism able to attack only the older and thus physiologically less active foliage would be aided by drought because from the physiological standpoint drought would have an effect similar to aging, increasing the proportion of susceptible needles.

To learn whether drought periods may have had an influence in the disease levels observed at Blacks Mountain, precipitation records there from 1938 through 1951 were reviewed. They indicated three deficiency periods during those years, gauged against monthly means (the annual mean for the period of record at the Station is 18.17 inches):[2]

Period	Length, Months	Precipitation deficit, percent
Nov. 1938-Nov. 1939	13	57
Aug. 1943-Mar. 1944	8	45
Jan. 1946-Feb. 1947	14	52

If moisture had been sufficient for needle infection, these dry periods should have resulted in a high level of needle fading in 1940, some increase in fading in 1944, and marked fading in 1947. From the infection ratings it will be noted that 1940 and 1944 were high. No observations were made in 1947, but the fact that the 1948 ratings were low suggests that those of 1947 may have been high. Periods of excess precipitation occurred from March through June of 1948 (166 percent) and from September 1950 through April 1951 (141 percent), but their effect on incidence of the disease, if any, cannot be judged.

Changes in Vigor and Risk Status

Ratings for general appearance of the trees under observation were made in 1940 under the categories excellent, good, fair, and poor and were repeated in 1946 and 1948 for most of the trees. Part were rerated again in 1951. Presence or absence of diseased needles was disregarded in the ratings, which were based on apparent tree condition and vigor as expressed in shoot growth, amount

[2]Hallin, William E. Unit area control as developed from ponderosa-Jeffrey pine management at the Blacks Mountain Experimental Forest. U. S. Forest Serv. Calif. Forest and Range Expt. Sta., Berkeley, California. 185 pp. August 1957. (Manuscript Report.)

TABLE 2.—*Hypodermella medusa*. COMPARATIVE INFECTION RATINGS FOR YEARS IN WHICH RATINGS WERE MADE, BLACKS MOUNTAIN EXPERIMENTAL FOREST

D.b.h. groups, inches	Basis, trees[1]	Mean numerical infection ratings by years							
		1940	1941	1942	1943	1944	1946	1948	1951
	No.								
Under 12	80	11.3	0	9.1	4.0	11.2	7.4	1.7	8.7
12 and over	68	9.9	0	8.5	3.8	10.4	5.7	0.9	8.8

[1]Three trees originally rated were omitted from the comparison because of early loss. In 1944 not all trees were examined and in 1951 part were no longer available because of relogging. Bases in numbers of trees for these years were respectively 20 and 49 percent less than the numbers shown.

TABLE 3.—CHANGE BETWEEN 1940 AND 1948 OR 1951 IN APPEARANCE RATINGS OF OBSERVED PONDEROSA AND JEFFREY PINES ATTACKED BY THE NEEDLE FUNGUS, *Hypodermella medusa*, BLACKS MOUNTAIN EXPERIMENTAL FOREST

D.b.h. group, inches	Trees with complete ratings	Change in appearance rating[1]					Net change to poorer	
		No change	To better	To poorer	Net change to better			
	No.	No.	No.	No.	No.	Pct.	No.	Pct.
4-11	74	53	18	3	15	20	—	—
12-23	52	34	6	12	—	—	6	11
24 & over	17	12	1	4	—	—	3	19

[1]Rated as: excellent, good, fair, poor.

of green foliage, length of needles, etc.

Table 3, in which changes in ratings are summarized by diameter groups, shows that for approximately 70 percent of the trees there was no rating change. The smaller trees actually improved in rating; only the group 24 inches d.b.h. and over showed a significant percentage shift to a poorer status. Five of the trees originally rated for appearance died during the rating period but mortality in three of these was ascribable to storm or logging damage. The other two, both under 12 inches d.b.h., were listed as in poor condition in 1940. Hypodermella could well have been a factor in their mortality.

When the observations were started, forest entomologists were concerned over the possibility that the disease, when severe, might induce a rapid increase in risk from bark beetle attack. The results provide no foundation for this concern. No insect risk ratings of the study trees were made immediately after the conclusion of the observation, but in 1954 *all* trees in Compartment G 8-10 were rerated by the entomologists, along with those in three other compartments in the Experimental Forest. About a third of the Hypodermella infected trees included in our observations were within Compartment G 8-10, and there was general agreement that the incidence of the disease in this compartment was as heavy as in any part of the Experimental Forest. Yet Furniss and Hallin (*3*) found that the number of high risk trees per acre 16 to 17 years after the original sanitation-salvage cutting was slightly less on this compartment than on two others where Hypodermella was practically absent (1.0 vs. 1.1 and 1.3 high risk trees per acre). Thus, under the site conditions found on the Blacks Mountain Experimental Forest, there are no positive indications of a more rapid change from low to high bark-beetle risk status in compartments with trees affected by Hypodermella than among those with almost no infected trees.

It follows that in assessing insect risk ratings the presence of the disease on the foliage should be disregarded, not only because of the lack of any close relationship between Hypodermella attack for a single season and risk, but also because of the wide fluctuations in incidence of infection by the fungus from year to year. The standard insect risk criteria should satisfactorily reflect the slow reduction in vigor induced by the disease in some of the susceptible trees over a span of years.

Conclusions

The observations reported here, although somewhat limited, are supplemented by those of a more general nature on the disease in California by the writer over a period exceeding 30 years and by those of others, such as Shope (*7*). On this background the following conclusions appear to be warranted:

1. The disease is widespread in the interior pine stands of the West but is prevalent only in localized areas of relatively limited extent. Even within these the percentage of infected trees is small, usually under 10 percent of the total tree population of the areas.

2. Susceptibility to the disease is apparently an inherited characteristic and is relatively constant. Trees showing no evidence of infection in a year favorable for the disease will not become infected in subsequent years.

3. Characteristically only the older and physiologically less active foliage is attacked, usually that over 2 years old. The apparent exception near Allenspark, Colorado, reported by Shope (*7*) is probably accounted for by very marginal site conditions and a different rainfall regime than that common closer to the Pacific Coast.

4. As a corollary to (*3*) the poorer the site the more severe and frequent the disease.

5. Drought, and particularly severe fall drought, favors an increased incidence of the disease on susceptible trees.

6. Years of high incidence of the disease tend to be followed by years of low incidence because heavy infections remove most of the susceptible older foliage.

7. On marginal sites the diameter growth and condition of susceptible trees is gradually reduced, resulting in eventual earlier mortality. On sites of better quality the effect is less marked. From present evidence the disease does not appear to be a major loss factor in the pine stands of the West.

8. Dying foliage from the disease should be disregarded in rating ponderosa and Jeffrey pines for risk from bark beetle attack. Only the usual criteria should be applied in rating affected trees.

Literature Cited

1. DARKER, GRANT D. 1932. The Hypodermataceae of conifers. Arnold Arbor. Harvard Univ. Contr. 1. 131 pp.
2. DEARNESS, JOHN. 1924. New and noteworthy fungi—III. Mycologia 16: 143-176.
3. FURNISS, MALCOLM M. and WILLIAM E. HALLIN. 1955. Development of high-risk trees in ponderosa and Jeffrey pine stands following sanitation salvage cutting. U. S. Forest Serv. Calif. Forest and Range Expt. Sta. Res. Note 94. 2 pp.
4. KEEN, F. P. 1936. Relative susceptibility of ponderosa pines to bark-beetle attack. Jour. Forestry 34:919-927.
5. LIGHTLE, PAUL C. 1954. The pathology of Elytroderma deformans on ponderosa pine. Phytopath. 44:557-569.
6. SALMAN, K. A. and J. W. BONGBERG. 1942. Logging high-risk trees to control insects in the pine stands of northeastern California. Jour. Forestry 40:533-539.
7. SHOPE, P. F. 1940. Some ascomycetous foliage diseases of Colorado conifers. Univ. of Colo. Studies, Ser. D. 2(1):31-43.

Effect of Age on Rooting of Loblolly Pine Air-Layers

Robert G. McAlpine
and L. W. R. Jackson

INTEREST and activity in forest tree genetics have increased considerably in the Southeast during the past decade. The demand for an abundant supply of high-quality seed has stimulated research on the selection and propagation of trees of superior characteristics. To facilitate this program, clonal lines from selected trees must be established and multiplied by vegetative means and finally outplanted in seed orchards.

Among the pines, grafting is widely used for the establishment of clones. Unfortunately, only the upper portions of the selected trees are represented in the resulting clones. The root systems must necessarily be those of the stock trees on which the scions are grafted. In many cases it is desirable to have the root systems of the clones genetically similar to those of the selected tree. This is particularly true when trees are being propagated from individuals apparently resistant to root diseases, or whose adaptability to site may be based on well-developed, efficient root systems.

In order to obtain the desired root systems, some portion of the tree must be induced to strike roots, either through cuttings, or by air-layering stems or branches. Pines, unfortunately, are difficult to root from cuttings. Air-layering gives better results because the material to be rooted remains attached to the tree and water is supplied through the xylem, which continues to function during treatment. Rooting is also influenced by age and decreases rapidly with an increase in the age of the tree from which the cutting is taken or which is air-layered.

Although the literature contains considerable information on the relation of age to the rooting of cuttings, little is available on the relation of age to rooting for a species over a range of age classes. The objective of this study was to determine the effect of age on the rooting of air-layered branches of planted loblolly pine (*Pinus taeda* L.) for several age classes.

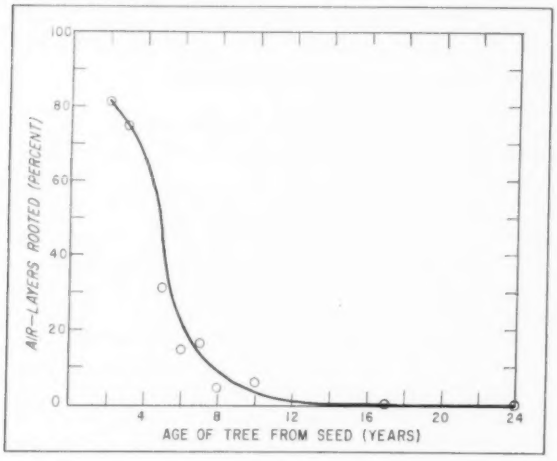
Methods

During the summer of 1956, individual loblolly pines were selected in plantations of known age in the vicinity of Athens, Georgia. From these plantings, 12 trees were chosen from each of 8 age classes: 3, 5, 6, 7, 8, 10, 17, and 24 years. In addition, 48 individuals were selected from 2-year-old potted seedlings.

Air-layers were applied following the procedure outlined by Mergen and Rossoll[1] using Hormodin

THE AUTHORS are respectively, research forester, Southeastern Forest Expt. Sta., Forest Service, U. S. Dept. Agric., and professor of silviculture, School of Forestry, University of Georgia. The work reported herein was done as a thesis for the Master of Forestry degree.

[1]Mergen, F., and H. Rossoll. How to root and graft slash pine. U. S. Forest Serv. Southeast. Forest Expt. Sta. Paper 46, 22 pp., illus. 1954.



Above

FIG. 1.—Root initiation by air-layering of loblolly pine related to age of tree.

Right

FIG. 2.—The effect of bridging in reducing root formation in 2-year-old loblolly seedlings.

No. 3 (0.8 percent indolebutyric acid in talc).

The treatments were started in mid-July and the final air-layer was made in mid-August. Because the time variable could be of importance in root initiation, the treatments were scattered more or less randomly among the different age plantations during the installation period.

Seedlings of the 2-year age class were air-layered on the main stems because branching had not progressed sufficiently to allow branch treatment. All other trees were treated on the branches only.

Mergen[2] found in air-layering slash pine (*Pinus elliottii* Engelm.) that the greatest number of roots developed on the side receiving the most sunshine. Allsop[3] found the same to be true in selecting cuttings from various positions in the crowns of Monterey pine in New Zealand. He recommended cuttings from the north (sunny) side of the crown. These conclusions indicate that crown position is important for successful air-layering. In our study air-layers were applied only to the upper ⅓ of the crown of dominant trees. The crown of each tree was divided into four quadrants: north, east, south, and west. One air-layer was made in each quadrant, making a total of 48 layers for each age class.

All air-layers were removed at the end of 70 days and the total number and length of all roots were recorded for each air-layer. The condition of the callus was classified as *none*, *poor*, *fair*, *good*, or *excellent*. The amount of bridging of the girdle by callus tissue was estimated as a percent of the girdled area. The diameter of the stem above and below the girdle was measured in millimeters and tenths of millimeters. All roots were removed and dried for 24 hours at 105°C. and weighed in milligrams.

[2]Mergen, F. Vegetative propagation of slash pine. U. S. Forest Serv., Southeast. Forest Expt. Sta. Paper 54, 63 pp., illus. 1955.

[3]Allsop, F. Propagation of *Pinus radiata* D. Don. by means of cuttings. New Zealand Forest Serv. Forest Res. Notes 1:1-17. 1950.

TABLE 1.—THE RELATION OF ROOT FORMATION BY AIR-LAYERING TO THE AGE OF TREE IN LOBLOLLY PINE

Age class	Air-layers			
	Undamaged[1]	Successfully rooted[2]		Average oven-dry weight of roots
	Number	*Number*	*Percent*	*Grams*
2	48	39	81	0.540
3	48	36	75	0.170
5	48	15	31	0.016
6	44	7	16	0.004
7	47	8	17	0.004
8	42	2	5	0.002
10	46	3	6	0.002
17	41	0	0	0.000
24	36	0	0	0.000

[1]48 air-layers were originally made. Those damaged by whipping, puncturing, loss of foil, and breakage were discarded.
[2]Based upon undamaged air-layers.

Results

The percentage of rooted air-layers, as shown in Figure 1, was highest in the youngest age class and decreased sharply thereafter. In the 2-year age class approximately 80 percent rooted, while none rooted on trees 17 years of age and older. The oven-dry weight of the roots followed a similar pattern (Table 1).

In the 2-year age class the root systems varied considerably in size. Twenty seedlings, whose root stocks died after the beginning of root formation, had such dense root systems in the air-layer that difficulty was experienced in extracting them from the moss. Those in which the root stocks remained alive produced smaller root systems, and those in which the girdle largely bridged over developed a few small roots (Fig. 2). In practically all seedlings where the root stock remained alive there was some bridging of the girdle by callus tissue.

Air-layers located in the four quadrants of the crown showed no differences in rooting ability. In the younger age classes, in which rooting was best, the crowns were so small that the amount of sunlight falling on each air-layer was fairly uniform. In the older age classes root development was too poor to draw any conclusions about the effects of crown position.

The correlation analysis between oven-dry weight of roots and stem diameter ratio showed no significance for either the 2- or 3-year old trees.

Some evidence was found to indicate that there was a variation in "rootability" between individual trees. In the 3-year-old age class the air-layers that did not root were localized on a few trees. In the 5-year class one tree had three rooted branches with the remainder scattered singly among the other 11 trees. In the 10-year class one tree had 2 rooted branches, while only one other branch had rooted on the remaining trees.

Time of year when air-layers were made apparently influenced rooting ability. For example, in the 5-year class the first 6 trees were treated 2 weeks earlier than the other group of 6 trees. The root systems developed in the first 6 trees were definitely superior in number of roots and in root length to those air-layered later in the season.

Summary

The effect of age of tree upon root formation by air-layering loblolly pines was tested. Four hundred and thirty-two air-layers were made on planted trees in age classes from 2 to 24 years. Rooting was best in the youngest age classes and decreased sharply with increasing age of the trees. Approximately 80 percent of the air-layers in the 2-year age class rooted while none rooted in trees 17 years of age or older.

Considerable variation existed in the number and oven-dry weight of roots formed on trees within a single age class.

Concentration of rooted air-layers on individual trees suggested that genetical factors may be involved in the ability of a tree to initiate roots under conditions existing in the air-layering process.

Timber Stand Maps, Plotless Cruising, and Business Machine Computation as Elements of a Timber Survey Method

Thomas J. Orr

THE TIMBER SURVEY method reported herein developed from an attempt to evaluate in quantitative terms the attributes of certain timber types as they were delineated on aerial photographs[1] and subsequently transcribed to a series of planimetric maps. The typing is based on the age-density concept developed by the California Forest and Range Experiment Station and the California State Division of Forestry under the direction of A. E. Wieslander (*1*). It is noteworthy that the maps provide the framework for any subsequent investigations into the problems peculiar to the area, whether these problems happen to be in the field of timber estimation, timber management, or in the field of research.

The process is to delineate timber types on the aerial photographs. This delineation is checked as the inventory work progresses, since the types can readily be recognized on the ground, and this results in a useful association in the mind of the user between the appearance of the stand on the photographs and its appearance on the ground. Soils maps are made on acetate overlays using the same photographs that were previously delineated for timber type. Once the field work is complete, the type map is transcribed to a convenient scale, the conversion from photo scale to map scale being made with a radial line plotter. At this stage, the area of each type may be determined. The result of this process is to divide the subject unit into type islands which are homogenous with respect to timber stand, and where soils are mapped with respect to both timber stand and soils. This is about the practical limit of stratification using readily detectable gross characteristics.

The importance of stratification is that the sampling can be designed to include each of the types, and so can be made representative. The use of the transcribed planimetric map to determine the actual area of each type is substantially more accurate than any other method, and this minimizes one troublesome source of error in timber estimation. More recent experience with timber stand maps as an aid to cruising has shown that the time spent in their preparation is more than repaid by savings in the work of examination in the field, even where the determination of volume is the only objective of the survey, and quite aside from their value in increasing the accuracy of the final result.

As forest management becomes more intensive, the need for improved information increases. The data collected in the course of a field examination will no longer be confined to the determination of merchantable volumes and may contain diagnostic elements such as Grosenbaugh (*2*) suggests. Such elements in this locality are, for example, susceptibility to insect loss, incidence of dwarf mistletoe and other diseases, incidence of animal damage, vigor as indicated by Keen's (*3*) tree classes, and any other elements that are basic to the management of the stand. Timber values are high, and quality information is often required. Information such as the foregoing is derived from stand tables, stock tables, log stock tables and tabulations of lumber recovery in terms of lumber grade groups, all of which depend on a record of the diameters and merchantable lengths of the sample trees.

A system of point sampling is apparently the method most easily adapted to secure information of this nature. The easiest device to use in point sampling is an angle gauge, of which the wedge prism is a convenient form. Grosenbaugh (*2*, *4*) gives the theoretical basis for point sampling involving the use of an angle gauge. The inherent advantages of the prism are first, that it is easier to identify the sample trees (at least in this area) than it is in the case of either fixed radius plots or fixed width strips; second, that the probability that a tree will be counted is in proportion to its own basal area, which means that the larger trees, which are usually more variable in volume and particularly in quality, are sampled in greater proportion than the smaller trees which are less variable in these attributes.

The usual simplicity in obtaining cubic and log scale volumes as the product of a volume factor times the number of trees counted becomes somewhat less important when the data are to be processed by accounting machines. Grosenbaugh (*4*) gives examples of vol-

THE AUTHOR is branch forester, Weyerhaeuser Timber Company, Klamath Falls, Ore.

[1]The objective of the project was to determine why it is difficult to secure regeneration of ponderosa pine on certain pumice soils in Central Oregon. The California standards of defining timber types (*1*) seemed to be the most practical, and therefore A. E. Wieslander and Robert E. Nelson were retained as consultants. To keep the project aligned with standards in use elsewhere in the State of Oregon, the help and advice of W. C. Hill of the Soil Conservation Service, Dr. C. T. Youngberg of the Department of Soils, Oregon State College, Ellis Knox of the State Soils Committee, greatly expedited the work of establishing standards. The mensuration phases are the responsibility of the author and C. O. Borsting and D. L. Hummel, of the local forestry staff. The assistance and advice of all participants is gratefully acknowledged.

A special acknowledgement is due C. Allen Bickford, whose painstaking review of an earlier draft of this paper helped materially to strengthen the presentation and to clarify some obscure points.

ume calculations which employ volume factors. The usual assumption is that these volume factors are constant for a given height class, at least to the degree that any trend with diameter may, for practical purposes, be neglected. This is a highly useful concept where cubic volumes are sought, but merchantable volumes in units of log scale are less tractable.[2] Bell and Alexander (5) propose a solution by tabulating different volume factors which vary by diameter within a given height class. Table I is an example of such a table, for the values appearing therein are volume per acre if the tally is made with a prism of basal area factor 10.

If four trees of the dimensions given below are counted at a given point with the above prism, the results of this tally are immediately available from Table I (except volume per tree, which is calculated).

Trees tallied			*Values from Table 1*	
D.b.h. inches	*Height logs*	*Volume per tree*	*Trees per acre*	*Volume per acre*
24	5	714	3.18	2,270
16	2	89	7.16	640
40	6	2,912	1.14	3,320
32	5	1,257	1.79	2,550
—	—	—	13.27	8,780

The volume of 8,780 is the sum of the appropriate values. It is also the product of the average ratio ($878 \div 4 = 219.5$), the number of trees counted (4) and the basal area factor of the prism (10). Furthermore, it is the product-sum of the four pairs of figures appearing above in the columns headed "Trees per acre" and "Volume per acre." Consequently, any one of the three methods of calculation will provide the same answer.

The use of prisms with different basal area factors obviously will produce results which are in direct proportion to the above. For example, the same trees tallied with a 20 factor prism means that the stand at that point is 26.54 trees, 17,560 feet per acre. If the basal area factor were 9.72, the result would be 12.50 trees, 8,270 feet per acre, and so on.

Where reports such as stand tables, stock tables and lumber grade recovery estimates are an objective of the survey, the diameters of the sample trees must be recorded. If these data are to be processed by business machines, then it may be a matter of convenience to make the volume computations depend on the same record. To adapt a record of trees tallied with a prism to machine processing, it is necessary to establish the weight of each observation. This weight is easily determined by establishing the conditions under which a sample tree will be included in the tally.

A tree of diameter D_i will be tallied if, and only if, it is within a circular plot whose center is the sample point and whose radius, r_i, is determined from the relationship shown in Figure 1. That is,

$$r_i = \frac{D_i}{2 \sin \tfrac{1}{2} \phi} \text{ (inches)} = \frac{D_i}{(2)\ (12) \sin \tfrac{1}{2} \phi} \text{ (feet)}$$

where ϕ is the critical angle of the prism. The area of this plot is obviously:

$$\frac{(\pi D_i)^2}{(4)\ (144) \sin^2 \tfrac{1}{2} \phi} = \frac{BA_i}{\sin^2 \tfrac{1}{2} \phi} \text{ (square feet)}$$

One definition of the prism factor is the quotient:

$$\frac{\text{Area of one acre (in square feet)}}{\text{Area of a plot for a tree of unit basal area}}$$

or:

$$PF = N_1 = 43{,}560 \div \frac{1}{\sin^2 \tfrac{1}{2} \phi} = 43{,}560 \sin^2 \tfrac{1}{2} \phi$$

TABLE 1.—NUMBER OF TREES AND SCRIBNER DECIMAL C VOLUME PER ACRE FOR A SINGLE OBSERVATION WITH AN ANGLE GAUGE OF BASAL AREA FACTOR, 10.00; PONDEROSA PINE

D.b.h. inches	Number of trees	Merchantable length, 16-foot Logs						
		1	2	3	4	5	6	7
		(Board feet in tens; i.e. (0) omitted)						
16	7.16	52	64	113				
18	5.65	57	69	119	160			
20	4.58	60	76	123	166	208		
22	3.78	64	80	127	170	219		
24	3.18	67	84	130	181	227	280	
26	2.71		87	137	184	238	286	
28	2.33			139	188	240	297	
30	2.03			141	195	251	302	362
32	1.79			142	199	255	307	367
34	1.58			148	205	257	316	370
36	1.41			149	206	258	320	373
38	1.26			149	207	266	320	385
40	1.14				215	269	332	388
42	1.03				215	276	332	388
44	0.94				217	278	334	402
46	0.86					281	345	403
48	0.79					289	347	406
50	0.73					290	349	408
52	0.67					289	347	405
54	0.62						348	417
56	0.58						351	421
58	0.54						352	421
60	0.50						349	419

[2] Mr. Bickford suggests that the reason for variation in the basal area-volume ratio may be due to the increase in the board foot-cubic foot ratio as diameter increases. This seems reasonable, since the values in Table 1 exhibit the same trend.

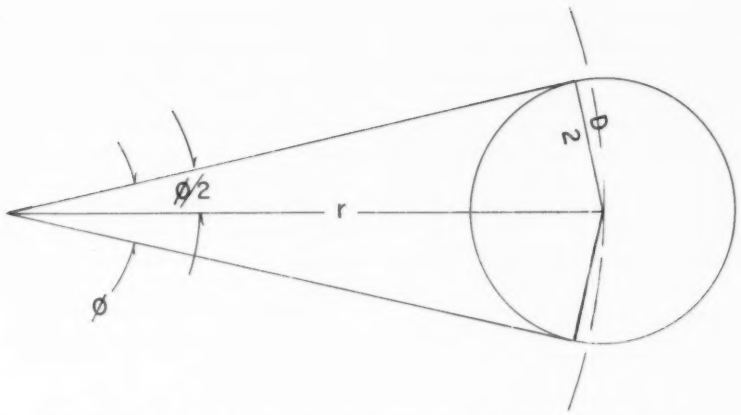


FIG. 1.—The radius, r, of a plot wherein a tree of d.b.h., D, will be tallied is:

$$r = \frac{D}{2 \sin \frac{1}{2} \phi}$$

where ϕ is the "critical angle" of the prism.

This establishes the notion that a tree of one square foot of basal area is given a weight identical in value to the basal area factor of the prism used. The weight of any tree observed with basal area, BA_i and diameter, D_i is the quotient:

$$\frac{\text{Area of one acre in square feet}}{\text{Area of plot for tree of diameter } D_i}$$

which is equivalent to

$$N_i = 43{,}560 \div \frac{BA_i}{\sin^2 \frac{1}{2} \phi} = \frac{43{,}560 \sin^2 \frac{1}{2} \phi}{BA_i} = \frac{PF}{BA_i}$$

In other words, the weight of one tree taken at one point is simply the quotient:

$$\frac{\text{Basal area factor of the prism}}{\text{Basal area of the tree}} = \frac{PF}{BA_i}$$

If the observation relates to an area of "A" acres within which a number "P" of sample points were taken, then the weight, N_i becomes:

$$N_i \text{ extended} = \frac{PF}{BA_i} \cdot \frac{A}{P}$$

This is nothing more than taking the average of a number of observed points and multiplying by the number of acres. Since the basal area is not recorded in the field, but diameter is, a more convenient form is easily obtained.

$$N_i = \frac{PF}{0.00545415\, D_i^2} \cdot \frac{A}{P} = \frac{183.347}{D_i^2} \cdot PF \cdot \frac{A}{P}$$

This factor is common to all subsequent calculations relating to the sample tree, and is the weight of the observation under the condition imposed upon it.

The total cruise of the type is a summation of values similarly obtained from the record of each sample tree. Figure 2, for example, is a field tally of four plots taken with a 20.00 factor prism in a type area of 16 acres. The type in question is a very open stand of old growth-young growth ponderosa pine with a rather dense understory of lodgepole pine growing on a deep (over 48 inches) Lapine pumice soil, this being roughly the meaning of the information appearing under "Type Code." The first entry in the field headed "Tree Detail" is a 44 inch, 7 log ponderosa pine, form class 83. The volume table (*6*) gives 4,380 feet for this tree. In this case:

Type area, $A = 16.00$ acres; Number of plots, $P = 4$

Prism factor, $PF = 20.00$; Diameter, $D_i = 44$ inches therefore, theoretically

$$N_i \text{ (extended)} = \frac{183.347}{(44)^2} \cdot (20.00)\ \frac{16}{4} = 7.58$$

Volume (extended) = (7.58) (4,380) = 33,180 Scribner.

In practice, the machine process rounds the value of N_i to the nearest tree for type totals, so the actual entry, as punched, is 8 trees, 35 M feet Scribner. This process of rounding introduces no element of bias or inaccuracy. Processing the field record for the 12 ponderosa pine trees (species Code 1) and the five lodgepole pine trees (species Code 6) over 6 inches shows that the estimate on the 16 acre tract is 144 ponderosa pine, 282 M Scribner, 46,100 cubic feet; 1,015 lodgepole pine trees 6 inches plus, 7,200 cubic feet.

The effect of using the weighting factor, N_i is to place all observations in correct weight regardless of the prism used, the number of points tallied, the area of the type sampled, and the individual diameters of the sample trees. This step converts the prism cruise to the same basis as any other cruise in that the results are additive. which is the principal reason for dealing with total type volumes rather than per acre values. This same weighting applies to any attribute such as susceptibility to insect risk, incidence of disease, quality that may be recorded for the sample tree.

In practice, the type number, description, the prism factor and the type area in acres, as shown in the heading of Figure 2 are punched on a master card, one card for each type. The constant 183.347, being common to all calculations, is emitted by the ma-

chine. The detail cards, one for each line of the body of Figure 2 contain the type number as a means of identification, and also the species, crown class, d.b.h., form class, merchantable height and other classification information as shown. The machine routine will vary according to the requirements of the problem, and according to the nature of the processing unit. In the present case, it will be more convenient to make the extensions on the original detail card since this will allow greater flexibility in preparing the reports.

The following routine has been set up with the International Business Machine's 602-A multiplying punch as the basic unit.

1. Compute the weight of each sample tree (N_i) as outlined, and the diameter of the first 16-foot log (form class times d.b.h. $= d$). Exact line trees (indicated by X in column 30 of the form) are given half value at this stage.

2. Compute cubic foot volume for all trees 6 inches d.b.h. and over, and Scribner volume for all trees 16 inches d.b.h. and over. This is accomplished by recording the appropriate factors on a master card, one such card for each merchantable height class. For the 44 inch, 7 log tree, form class 83, d $= 36.5$ inches. The cubic volume formula is in the form $N_i \frac{(Kd^2 + D^2)}{Q}$, where K and Q are constants for each height class. In the example given

$$\text{Cubic Volume} = 8 \frac{(3.3476)\ (36.5)^2 + (44)^2}{9.62} = 5{,}318 \text{ cubic feet}$$

The Scribner volume formula is given by Mason, Bruce and Girard (6).

Scribner Volume $= N_i\ (Ad^2 + Bd + C)$, where A, B, and C are constants for each height class. In the example Scribner Volume $= 8\ [(3.61)\ (36.5)^2 - (11.1)\ (36.5) - 28] = 35{,}008$ board feet.
The entry is punched as 8 trees, 53 hundred cubic feet, 35 M board feet.

3. Compute the diameter of each log in the sample tree to the nearest inch, using taper factors published by Mason, Bruce and Girard (6). In this example the diameters of the seven logs from

TIMBER ESTIMATE **PLOT DATA**

Description: Antelope Soil-Vegetation
Examined: 6 (MO) 24 (DAY) 58 (YEAR) By G. Kilen

MEMO (Master Card)

Block 2 Status 0
Total Acres 16.00
Prism Factor 20.00
No. Plots 4

Type Code

Veg.	N	OY 442
	D	Lm BC
Soil	N	Ll. C8
	D	B

PUNCH RECORD (DETAIL CARD)

I. Heading: (Duplicated Fields -------- All Cards)

Sec.		Twp		Rge		Type No.				Acres						Timber Acc't		
3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	78	79	80
3	7	4	2	1	7	3	0	0	1	0	0	1	6	.	0	0	6	1	4

II. Tree Detail:

	Plot No.		Species	Tree Class	Risk	D. B. H.	Height 16' Logs — Form Class or Nonmerch. Total Ht.	Porcupine	Mistletoe	Line Tree & or Tbr Grp	LOG GRADES									
	1	2	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1	0	1	1	4	1	1	4	4	7	8	3	0	0		1	2	3	5	5	5	5			
2			1	4	2	1	3	4	5	7	9	0	0		1	2	3	5	6					
3			6	1	3	0	0	4	X	X	X	1	8	X										
4			6	1	3	0	0	4	X	X	X	0	8											
5			6	1	2	0	0	4	X	X	X	0	8											
6			6	1	2	0	0	8	X	4	0	0	3											
7			6	1	1	0	0	8	X	5	0	0	3											
8			6	1	2	0	0	6	X	4	0	0	0											
9	0	2	6	1	1	0	1	4	X	6	0	0	0											
10			6	1	1	0	1	4	X	7	0	0	0											
11			1	4	3	1	3	8	5	8	1	0	2		2	3	3	5	5					
12	0	3	1	4	2	1	3	8	6	7	7	0	0		1	2	3	5	6	6				
13			1	4	2	1	3	8	5	8	0	0	0		2	3	5	5	6					
14			1	3	2	1	2	8	6	7	7	0	3		1	3	3	5	5	6				
15			1	3	1	1	3	0	5	7	5	0	0	X	2	3	3	5	5					
16			1	3	1	1	3	0	6	7	8	0	0		1	2	3	5	5	6				
17	0	4	1	4	2	1	3	2	7	8	1	0	0		1	2	2	3	3	5	5			
18			1	3	1	1	4	0	6	7	9	0	0		1	2	3	5	6	6				
19			1	3	1	2	2	8	6	8	0	0	2		2	3	3	5	5	6				
20			1	4	3	1	4	2	6	8	2	0	0		1	3	3	5	5	6				

PUNCHED

FORM KF 265 WTCO Sheet 1 of 1

FIG. 2.—Field record of sample trees.

the seven logs from

butt to top are 37, 35, 32, 30, 27, 23, 18. This information is used later in calculating the lumber grade recovery, which in this case will consist of the sum of the lumber production (as determined by an appropriate lumber grade recovery study) for the component logs of the tree; that is, a 37 inch grade 1, 35 inch grade 2, 32 inch grade 3, 30 inch grade 5 and so on, each weighted by the factor N_6 in this case 8.

4. Expand the tree detail deck (by means of a document originating machine such as I.B.M. 519), recording the weight, the diameter and the grade of each log in each sample tree, one card for each such entry.

5. Summarize the deck of log cards obtained in (4) by means of a tabulating machine such as I.B.M. 402-A and so obtain the total number of logs of each diameter and log grade in the sample.

6. Calculate the lumber grade recovery from the summary cards obtained in (5).

The following exhibits may then be prepared as required.

1. Stand tables, number of trees and volumes for each 2-inch class, classified in any required manner, for example Keen's Classes (*3*), and further classified with respect to cut and leave fractions of the stand.

2. Number of trees and volume of type area.

3. Log stock tables in terms of size and log grade.

4. Volumes by species by legal subdivisions.

5. The yield of the stand in terms of lumber grades.

It will occur to any reader familiar with the more modern data processing machines that many of the calculating steps given above could be combined. For example, steps 4, 5, and 6 could readily be combined if the data were to be processed on a unit such as the I.B.M. 650 at a substantial saving in time and perhaps cost. However, many reports, particularly those of a diagnostic nature, will depend on tabulating the detail deck. For this reason, the most promising avenue toward speeding up the computing process appears to be that of substituting a faster calculating punch for the 602-A unit. One of the hitherto unstated objectives of this paper however, is to suggest that these data may be processed on virtually any unit that happens to be available, and further that, while the more modern machines are highly desirable, they are not an absolutely indispensible element of the process.

Summary

This approach to the problem of timber estimation consists of three elements. First, the area is stratified as accurately as possible from aerial photographs. Land examination is made to depend upon the resultant timber stand map. The contribution of such stratification is to insure representative sampling and to determine type areas accurately. Second, the wedge prism is used in conjunction with a scheme of point sampling to provide the basic data. This is a somewhat more efficient, and perhaps more accurate device than fixed radius plots. Third, once the field data are transcribed to punch cards, the computational work is entirely mechanical, which has the obvious advantages of speed and accuracy in reducing data. The most important consideration is that the three phases of the work be correlated and pointed toward the same objective; that is, the processes of field sampling and data processing are designed to depend upon the information obtained by stratification, and so to exploit its advantages.

The examination is of an intensive nature, and consequently its costs and results should be compared with those of intensive cruises. If a reasonably good base map is available which shows the photo centers of the flights, then the costs of making the maps, making the field examination, and obtaining a comprehensive report in the aggregate are about one-third less than the costs of a 20 percent strip cruise which, at best, will provide only part of the information. Under local conditions, this cost is between 30 and 35 cents per acre for the package.

The estimate is at least as accurate as those obtained by alternative methods. In one case an area of 1,920 acres was stratified into 29 types. Each of the 29 types was sampled roughly in proportion to its own area, the minimum number of points within a type being 33, the maximum 43. Six man days were required to record the 190 sample points, which resulted in a deck of 1,000 cards, one for each sample tree. The computed Scribner volume was 29,172 M compared with 30,072 M obtained from a plot cruise (by another agency) controlled to an accuracy of plus or minus 5 percent. A second check on an area of 1,800 acres showed that the original cruise was 1.8 percent over the sum of the log scale removed from the area and the cruise of the residual stand. With respect to dollar values, the estimated value from standing tree grades was within three percent of the value obtained from a lumber tally taken at the sawmill from logs from the same area. Roughly half of this difference could be traced to differences between the conversion tables and the mill practice. With respect to diagnostic ability, an area of 45,000 acres was rated with respect to incidence of dwarf-mistletoe. This rating consisted of no infestation, and then five equal 20 percent intervals in terms of cubic volume affected, which were delineated on the type map using the original strata. Field examination proved that the map so obtained is highly accurate.

Empirical results are a rather critical test of the realism of any system of timber estimation, but they do not provide tests that are conclusive in a statistical sense. Until some determination of the sampling error is made, it is not possible to say whether the estimate is actually highly accurate, or whether it is the result of a fortuitous combination of compensating errors. Furthermore, it is not apparent why a prism cruise equiv-

alent (in terms of trees counted) to a 2½ percent cruise should compare in accuracy with a 20 percent strip cruise, yet this condition is consistently indicated by the results even on relatively small areas.

Some aspects of the statistical problems arising from the use of the prism have been explored, but many phases will require additional work. Grosenbaugh (*4*) has deduced the standard deviation of basal area. His extension of the results to include the calculation of statistics describing the spatial distribution of basal area and could greatly fortify the present subjective and nebulous concepts of stocking. Bell and Alexander (*5*) show that the sampling error of volume is the square root of the sum of the variance in number of trees tallied per plot and the variance in volume factors, such variance being expressed in percent. They express some dissatisfaction with the results in that the process assumes that the number of trees tallied and the volume factor are independent, while in reality there is some apparent correlation between the two variables.

Since the method of estimation proposed in this paper depends on different postulates than those employed where a volume factor is basic, it seems reasonable to expect that the sampling error will be different. Variability in estimates of a type total volume arising from a series of points in a stratum may come from three sources; first, in the number of sample trees tallied; second, from the sampling of the diameter distribution of the type as indicated by the diameters actually tallied; third, in the volume attributed to each sample tree, which will depend upon form and merchantable length. This complexity suggests that an attempt to deduce a mathematical relationship could well result in an equation which is impractical to apply. If it is postulated that each sample point provides an independent estimate of the population attributes then, at the expense of a substantial amount of mechanical calculation, it will be possible to determine the magnitude of the sampling error, and whether the estimates are normally distributed about their mean value by standard and well known methods.

A number of highly important questions could be answered if the nature of the sampling error were known. First, with respect to strata, in what attributes do they differ? Second, with respect to sampling, what is the number of points that should be tallied to achieve a specific degree of accuracy, and is that number related to or independent of the critical angle of the prism? Third, is it practical to develop a scheme of sequential sampling such as suggested by Smith and Ker (*7*), after the concept by Dr. Abraham Wald (*8*), if volumes are the attributes involved? Exploration of any of these avenues should be rewarding. They are commended to the attention of some diligent and capable student.

Literature Cited

1. CALIFORNIA FOREST AND RANGE EXPT. STA. AND STATE DIVISION OF FORESTRY. 1949. The timber stand and soil-vegetation maps of California (a series of maps prepared by the Forest Survey Staff, Division of Forest Economics, for the State Division of Forestry).
2. GROSENBAUGH, L. R. 1955. Better diagnosis and prescription in southern forest management. Occasional paper 145. Southern Forest Expt. Sta.
3. KEEN, F. P. 1943. Ponderosa pine tree classes redefined. Jour. Forestry 41:249-53.
4. GROSENBAUGH, L. R. 1952. Plotless timber estimates—new, fast, easy. Jour. Forestry 50:32-37.
5. BELL, JOHN F. in collaboration with Lucien B. Alexander. 1957. Application of the variable plot method of sampling forest stands. Research Note No. 30 Oregon State Board of Forestry.
6. GIRARD, JAMES W. and DONALD BRUCE. (No date.) Tables for estimating board foot volume of trees in 16 foot logs. Published by Mason, Bruce and Girard, Portland, Ore. 44 pages.
7. SMITH, J. H. G. and KER, J. W. 1958. Sequential sampling in reproduction surveys. Jour. Forestry 56:107-109.
8. WALD, A. 1947. Sequential analysis. John Wiley and Sons, Inc., New York.

Nutrition and Fertilization Information Center Established

The establishment of a clearing house of information on nutrition and fertilization of southern forests by the National Plant Food Institute, in cooperation with the National Joint Committee on Fertilizer Application, was recently announced by Dr. Laurence C. Walker, Southeastern regional forester for the Institute.

This information center will receive details of experiments for subsequent distribution to interested persons. To receive these periodic releases, those on the mailing list are obligated to submit information relative to their own work on nutrition and fertilization.

Dr. Walker is presently soliciting participants and requesting brief summaries of research underway, including personnel, organization, location, and experimental description. Tentative conclusions are not desirable; but final results are. The first mailing to cooperators was expected by midsummer.

Persons desiring to be included on the mailing list should address the Southeastern Regional Forester, National Plant Food Institute, 190 Hardin Drive, Athens, Georgia.

Should response to this southwide program be favorable, the Institute and the NJCFA plan to expand the scope to include all of the United States and Canada.

Dr. Walker points out that this venture is cooperative: both the Southeastern Regional Forest Fertilization Task Force of the NPFI and the Forestry Sub-committee of the NJCFA are comprised of research and practicing foresters representing industry, government, and education.

White Pine in Western Washington

John W. Allen

IN WESTERN WASHINGTON western white pine (*Pinus monticola* Dougl.), though far surpassed in total volume by its associated species Douglas-fir and subjected to attacks by blister rust and the mountain pine beetle (*Dendroctonus monticolae*), is a species of considerable interest. It is found in every county on the west side of the Cascade Mountains ranging in elevation from sea level to 4,000 feet, and occurs in significant volume on restricted areas where soil conditions are unfavorable to its prime competitors, Douglas-fir and western hemlock.

Western white pine's apparent ability to out-grow both hemlock and Douglas-fir on these restricted areas has in the past prompted many forest owners to consider western white pine in their management planning. Such plans were usually dropped after investigation revealed the heavy mortality due to blister rust and beetles. Today, in light of intensive forestry practices, road networks that will permit quick salvage of rust infected or beetle trees, optimistic reports on blister rust resistant strains, chemical sprays for killing ribes, and antibiotics for controlling cankers, it is time for a new consideration of growing western white pine as a commercial forest tree.

Annual Cut

From 1940 to 1956 the western Washington production of white pine lumber ranged from a low of 2.8 MM board feet in 1949 to a high of 8.7 MM board feet. in 1941[1]. The mean production for this period was 6.0 MM board feet, which represents the lumber portion of the annual cut. The Puget Sound Log Scaling and Grading Bureau's 1956-1957 breakdown of white pine logs scaled is:[2] sawmill logs 85 percent, veneer logs 13 percent, and cull logs 2 percent. Assuming that 6 MM board feet of lumber is 85 percent of the total, the average annual cut is 7 MM board feet.

Total Merchantable Volume

Data provided by five private timber companies in 1957 reveal that western white pine comprises from 0.1 percent to 4.0 percent of their merchantable timber volume; and the average, weighed by acreage, is 0.4 percent. This average percentage applied to total volume for all species as compiled by the Forest Survey, 199,599 MM board feet, (Table 1) gives 800 MM board feet of western white pine. This is one-half of the total white pine timber volume, 1,842 MM board feet (Table 1) and suggests that for western Washington the volume of merchantable white pine timber is between one billion and two billion board feet. By comparison, cutting data from neighboring British Columbia (*2*) show 1956 white pine cut was 0.6 percent of the total cut, about midway between the private timber company cruises and the Forest Survey data.

Distribution

White pine occurs as a scattered, infrequent tree throughout western Washington, becoming important only in particular locations. For example, one 1958 timber sale in eastern Pierce County had 2 percent white pine. Parts of Skagit and Whatcom counties where the soil is shallow and of a serpentine and basalt origin have a timber cover in which white pine comprises 2 to 10 percent of the volume. Cedar bogs in Grays Harbor and Jefferson counties have fringes of timber with up to 25 percent white pine by volume. On gravel banks in Kitsap County white pine may dominate the stands of timber and have more than 50 percent of the volume.

Data supplied by private timber companies indicate that the volume of white pine in a stand may increase as the Douglas-fir site quality decreases. A rough trend seems to be as follows: Douglas-fir, sites I and II, 0.0 percent white pine, site III, 0.3 percent; sites IV and V, 1.5 percent; very low sites, 5 percent or more.

Growth Rate

No published information is available on the growth rate of white pine in western Washington. However, visual evidence of superior growth in localized areas is seen where a 300-year-old Site V Douglas-fir stand has 30-to 40-inch d.b.h. white pine alongside 8- to 20-inch Douglas-fir, hemlock, and redcedar (Fig. 1). Figure 2 shows a direct comparison of height

TABLE 1.—WESTERN WHITE PINE TIMBER VOLUME FROM FOREST SURVEY (*1*)

County	Designated year	Volume of live sawtimber	
		White pine	All species
		MM board feet	
Colallam	1945	134	19,581
Cowlitz	1949	53	20,858
Grays Harbor	1951	181	20,708
Jefferson	1945	68	15,955
King	1945	149	18,370
Lewis	1952	334	29,890
Mason	1951	111	5,651
Skagit	1945	65	12,548
Skamania	1950	588	27,384
Snohomish	1955	82	20,572
Whatcom	1945	77	8,082
Total		1,842	199,599

THE AUTHOR is forest manager, Bloedel Timberlands Development, Inc., Winslow, Wash.

[1]Personal communication from Ernest L. Kolbe, forester of the Western Pine Association, Portland, Ore.

[2]Personal communication from B. J. DeMers, manager of the Puget Sound Log Scaling and Grading Bureau, Tacoma, Wash.

FIG. 1.—Two white pine trees dominating a mixed stand on a low Douglas fir site, Skagit County, Washington.

FIG. 2.—White pine tree dominating Douglas-fir and hemlocks on gravel soil, Hood Canal, Washington.

growth with the white pine dominating the Douglas-fir and hemlock.

Some local white pines attain a d.b.h. of 50 to 55 inches (*3*), with unverified claims indicating trees of over 60 inches d.b.h. These sketchy, visual impressions should be replaced with actual growth and yield tables. Along with this should go detailed soil analysis and ecological studies to provide needed data for determining the best sites for planting white pine.

Value of White Pine Standing Timber and Logs

White pine has almost always been in demand and has commanded a good price. Recent sales in the Puget Sound country have found mature white pine timber bringing stumpage prices from $15 to $30 per M board feet. Second-growth and small old-growth stumpage have brought from $5 to $15 per M board feet. Such high stumpage values are only for short term sales where logging can be completed within a few years.

In log form, delivered to salt water or directly to the mills, white pine brings $65 to $85 per M board feet for veneer logs and $40 to $55 per M board feet for sawlogs. This compares very favorably with prices paid for Douglas-fir with the exception of the premium paid for the very large, deep-clear, Douglas-fir veneer logs. A Silverdale, Washington millpond completely filled with white pine logs is pictured in Figure 3. The sawmill operator in 1958 had a larger profit margin when cutting white pine than when cutting any other local species.

Development of Blister-Rust-Resistant Western White Pine

One major deterrent to the management of white pine in western Washington—the lack of blister-rust-resistant planting stock—probably will be removed in the next few decades. Tests of first-generation progenies of rust-resistant parent selections underway in northern Idaho, southwestern Washington, and southern British Columbia are proving that resistance is truly a heritable trait. Also that in some cases it is transmitted to an encouraging degree between resistant parents and their first-generation offspring.[3] Region 6, U. S. Forest Service, is scouting for resistant white pine and pushing a program for seed orchards from which resistant planting stock can be obtained.

[3]Personal communication, R. T. Bingham, Northern Idaho Forest Genetics Center, U. S. Forest Service, Moscow, Idaho.

Private timber land owners have played an important part in this significant development. Bloedel Timberlands Development, Inc., and the Port Blakely Mill Company are assisting with progeny tests of rust-resistant materials. The Weyerhaeuser Timber Company and various tree farmers are assisting in locating rust-resistant and other types of superior white pine selections. The Col. W. B. Greeley Forest Nursery is making grafts of resistant selections thus found.

Discussion

The rate at which the old-growth white pine forests in western Washington are being logged, about seven million board feet per year, is so slow that barring accelerated losses to rust and beetles there could be a continuity of supply of white pine logs during the time it will take to produce resistant strains and to grow resistant seedlings to merchantable size. For the next decade it would be desirable to have an expanded logging program to clean up as much of the dying and diseased white pine as possible.

The natural seeding of white pine has been rapid in most areas where a suitable seed source exists, particularly on severe sites where

there is little competition. However, the resulting seedlings and saplings have been so susceptible to blister rust that within a few years there is extremely heavy mortality. The possibility exists that some resistant trees will result from natural selection and eventually establish white pine with a fair degree of blister rust resistance. However, such a process would involve too many generations to be practical for maintaining a reasonable cut until harvest cuts begin in planted resistant material.

In the scattered stands of western Washington maintenance of white pine by controlling ribes has usually been rejected as too expensive. Perhaps this is because no western Washington ribes control costs are available. Costs are known for controlling brush species other than ribes and these figures should be a basis for estimation of cost of ribes control. Using such data and other information from western Washington on cost of seed, aerial seeding, and management costs, three different methods for establishment of white pine are considered:

(1) Aerial brush control and aerial seeding of one-half pound Douglas-fir and one-half pound ordinary white pine seed per acre on Site 80 Douglas-fir land. A follow-up ribes control program to include periodic checks and spot control by basal spray and foliage wetting of ribes.

Initial costs—land, aerial spraying, and seeding—are carried at 5 percent simple interest.

Annual costs—property taxes, management, overhead, and the follow-up ribes control — are carried at 5 percent simple interest.

Risk and profit margin is 20 percent.

Total return necessary to meet the above conditions is about $10 per acre per year. Based on 1958 stumpage prices, the value of the annual increment will be from $4 to $5 per acre per year.

Conclusion: if a ribes control program of the magnitude specified is necessary, then the commercial growing of white pine as a mixture with Douglas-fir on Site 80 land is not currently practical.

(2) No ribes control, aerial seeding of one-half pound Douglas-fir and one-half pound white pine seed gathered from resistant parent trees, wind pollinated. The land is Douglas-fir Site 80.

Costs are computed as in the first method.

Risk and profit margin is 40 percent. The area should be amply stocked with Douglas-fir if the white pine is a failure.

Total return necessary is over $5 per acre per year which is above the $4 to $5 per acre per year value of the estimated annual increment.

Conclusion: with costs reduced to a minimum the annual increment from the mixed fir-pine stand is not sufficient to pay its way.

(3) No ribes control, aerial seeding of one pound of white pine seed from crosses of resistant parent trees. This is in anticipation of when such seed will be made available. The land is Douglas-fir Site 80.

Costs are computed as in the first method.

Risk and profit margin is 50 percent. The entire stand is white pine and is totally dependent upon the heritable resistance to blister rust.

Total return necessary is about $6 to $8 per acre per year. The value of the annual increment of pure white pine will be about $6 to $8 per acre per year.

Conclusion: white pine might be established in pure stands by this method, but actual use on large areas must wait until resistant crosses are proven and seed orchards can provide the resistant seed in quantity.

A consideration for the planting of white pine seedlings in small areas, too small for aerial seeding, is that white pine appears to be resistant to the root rot, *Poria weirii*, and may be suitable to restock poria foci. Figure 5 pictures a white pine tree that is thriving on a poria focus after all of the competing Douglas-fir have succumbed to the root rot. Douglas-fir seedlings on the area have turned yellow while the white pine reproduction is still vigorous and green. Once white pine is well established in a forest area it should seed in well from seed blocks and not require expensive regeneration techniques.

Summary

The present stand of one billion to two billion board feet of western white pine in western Wash-

FIG. 3.—Mill pond completely filled with white pine sawlogs in summer of 1958, Silverdale, Kitsap County, Washington.

FIG. 4.—Young white pine growing at a rapid rate, Port Blakely Tree Farm, Kitsap County, Washington. It is 17 feet in height, 3.0 inches d.b.h., and has eight visible branch whorls. The area is typed as a Douglas-fir site index 80.

FIG. 5.—Poria weirii focus where the Douglas-fir trees have died, but the western white pine tree continues to flourish. George Tytler Tree Farm, Lofall, Washington.

ington is being cut at the rate of seven million board feet per year. The rapid deterioration of the remaining timber from the attacks of blister rust and beetles indicates the need for a major effort to salvage as much volume as possible.

No growth data for local white pine are available and the soil conditions for minimum and optimum growth have not been established. Growth, soil, and ecological studies are needed. Current research is aimed at developing a strain of white pine resistant to blister rust, and some of the first-generation crosses currently being tested show indications of having a useful level of resistance. The earliest date for any commercial quantities of proven resistant seed is 30 years ahead. For preliminary testing the most economical plan for establishment appears to be aerial seeding with no attempt at ribes control. Since the cost of resistant seed will be of major importance for extensive use, it must be available in large quantity at low cost. Along with the seed should come some data on the resistance to expect.

There are several new developments in white pine management that are currently being evaluated, such as chemical control of cankers, application of the antibiotic cycloheximide and possible pole blight problems. When these developments are understood, another reconsideration of growing white pine as a commercial forest tree will be in order. Meanwhile the interest of foresters in growing white pine should increase since no other species has shown the growth potential that western white pine apparently has on thousands of acres of low site land in western Washington.

Literature Cited

1. Forest Survey, Pacific N. W. Forest and Range Expt. Sta., Forest Service, U. S. Dept. Agric. 1945-1955.
2. Report of The Forest Service. 1956. Province of British Columbia, Dept. of Lands and Forests.
3. BROCKMAN, F. C. 1956. Western white pine. Arboretum Bull. XIX (1):5.
4. MCARDLE, R. E., and W. H. MEYER. 1930. The yield of Douglas-fir in the Pacific Northwest. Tech. Bull. No. 201. U. S. Dept. Agric. Table 3, p. 24.

Notes and Observations

A Device For Measuring Crown Diameters Of Open-Grown Trees

The Crown Competition Factor concept of stand density reported by Krajicek and Brinkman[1] working in Iowa stimulated the writers to determine the d.b.h.-crown area relationships for open-grown loblolly pine. In the process of the work, we fabricated a simple, inexpensive tool for measuring crown diameter which is both quick and easy to use.

The computations, figure, and table which follow explain the mathematical principle involved, illustrate the structure of the device, and give a table of the calibrations employed.

Referring to Figure 1, to find the distance to mark out each way from the center of the cross-arm (*BD* and *BF*) for various crown radii, let *G* (graduated distance on the cross-arm) represent *BD* and *BF*, let *r* (crown radius) represent *CE* and *CG*, let *L* (stick length) represent *AB*, let *X* (distance from eye to stem of the tree) represent *AC*. *ABD* and *AEC* are similar triangles. Therefore,

$$G : L = r : AE$$

$$(1)\quad G = \frac{Lr}{AE}$$

Since $AE = \sqrt{X^2 - r^2}$, substitution in (1) above,

$$(2)\quad G = \frac{Lr}{\sqrt{X^2 - r^2}}$$

This derivation is similar to that developed for the Biltmore scale.

We found a stick length (*L*) of 3 feet and a distance from the tree

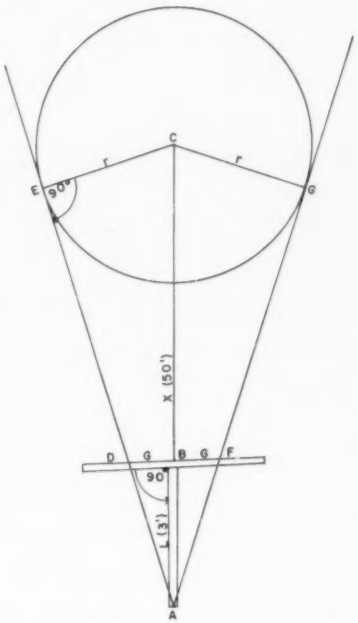


FIG. 1.—Illustration of geometric relationships.

(*X*) of 50 feet to be convenient. These values were used in calculating the cross-arm graduations in Table 1.

In use, the crown must be centered on the cross-arm rather than the center of the cross-arm being in line with the stem of the tree.

Crown diameter is measured at its widest part. With trees which have always been open-grown, this point on the crown is usually quite low. If the operator is 50 feet from the base of the tree and he raises his sight above the horizontal, the distance from his eye to the center of the crown at that height is greater than 50 feet. If that elevation of his sight is 15 feet (about 20 feet up from the base of the tree), the sighting distance is 52.2 feet. To reduce this distance to 50 feet, he should move in to 47.7 feet. With this error in distance, if he reads the crown diameter as 20 feet he is low 1.22 feet (true crown diameter is 21.22 feet). In looking to lesser heights which is usually the case, the error (always positive) is probably too inconsequential to warrant correcting distances.

The corrected horizontal distances to use where the points sighted are 20 and 25 feet above eye level are 45.8 feet and 43.3 feet.

LARRY C. BREWER, DONOTHAN O. BYRD, PAUL W. REA, EDWARD G. ROBERTS

Respectively, senior students and professor, School of Forestry, Mississippi State University, State College, Mississippi.

TABLE 1.—CROSS-ARM CALIBRATION USING 3-FOOT STICK AND 50-FOOT DISTANCE FROM TREE

Crown radius	Cross-arm calibration[1]	Crown radius	Cross-arm calibration[1]
Feet	*Inches*	*Feet*	*Inches*
3	2.16	12	8.90
4	2.89	13	9.69
5	3.62	14	10.50
6	4.35	15	11.31
7	5.09	16	12.16
8	5.83	17	13.01
9	6.59	18	13.89
10	7.35	19	14.79
11	8.12	20	15.71

[1]From the cross-arm center, measure both left and right.

[1]Krajicek, John E., and Kenneth A. Brinkman. Crown development: an index to stand density. Central States Forest Expt. Sta. Station Note No. 108. 1957.

Polyethylene Bag Packaging of Conifer Planting Stock in the Pacific Northwest

Forest planting stock is commonly shipped in bundles which protect the roots from drying, but expose the tops to air and light (*1, 5, 6, 7*). This may be considered the standard procedure, even though crating (*6*) and other types of bulk shipment are sometimes used. There is a doctrine, sometimes unwritten, often explicit, that tops should be well aerated in storage (*2*).

During 1954, several articles by Prof. John P. Mahlstede on the use of polyethylene films for packaging nursery stock appeared in the *American Nurseryman* (*4*). In general, these referred to packaging of the larger plants generally shipped by growers of ornamentals. Mahlstede's results showed that polyethylene packages which completely enclosed whole plants were effective.

In the winter of 1955-1956 we made a few experimental shipments of seedlings completely enclosed in polyethylene to several companies in western Washington and Oregon. The polyethylene was in the form of a thin laminate on the inner ply of 3-ply multi-wall Kraft bags. We repeated experimental shipments more extensively in the winter of 1956-1957. At the same time, small-scale nursery experiments in which 2-0 Douglas-fir seedlings were held up to 4 months at 35° F. in polyethylene freezer bags indicated that extended storage under these conditions was successful. Receipt of unanimously favorable reports from the planters who received the experimental bag shipments impelled us to ship the bulk of our production of 13 million trees in polyethylene-Kraft bags in the winter of 1957-1958. Again, reception of the new package was favorable.

Inasmuch as the complete enclosure of bundles of planting stock is a violation of some widely-accepted precepts, it seems worth while to review in detail the past and current packaging procedures at the Greeley Nursery and the advantages which bag packaging offers.

More than 80 percent of the annual production of the Greeley Nursery is 2-0 Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco). The remainder, in order of importance, consists of noble fir (*Abies procera* Rehd.) grand fir (*Abies grandis* [Dougl.] Lindl.), Pacific silver fir (*Abies amabilis* [Dougl.] Forbes), Sitka spruce (*Picea sitchensis* [Bong.] Carr.), Port Orford cedar (*Chamaecyparis lawsoniana* [A. Murr.] Parl.), and western hemlock (*Tsuga heterophylla* [Raf.] Sarg.). All of these species have been packed successfully by both of the procedures to be described.

Bundle packaging procedure.—A handful of wet Canadian granulated horticultural peat is placed on a 12 by 18 inch sheet of waxed Kraft or oil-impregnated meat wrapping paper. The roots of a bunch of 50 seedlings are laid on the peat and covered with a second handful of peat. The paper is then wrapped about the peat and roots so as to leave the tops exposed. Ten such bunches, or in the case of small 1-0 stock, 20 bunches are laid in a 12 by 36 inch band of waterproof Ocean Wrap or Ordinance cloth so that the tops are outward when the band is wrapped about the bunches. The bundle is then tied with two wraps of four ply jute tube rope.

Bag packaging procedure.—The bundle packaging procedure has been modified only to the extent of substituting a Kraft-polyethylene bag for the band of Ocean Wrap and laying the 50-seedling bunches in the bag alternately so that they lie roots by tops. The bags are of double-wall construction with a sewn bottom and open mouth. The inner wall consists of a 10 pound polyethylene laminate on 50 pound Kraft paper; the outer wall of 50 pound wet-strength Kraft. Bag sizes used are as shown in Table 1. These bags are made by several well-known paper-product fabricating firms in the United States and Canada. The bags are closed by wrapping the open top about the body of the bag and tying as with the bundles.

From the point of view of the nurseryman, this procedure results in a package which is easy to handle and store. Toward the end of the lifting season at the Greeley Nursery, it is often necessary to store as many as a million seedlings for periods up to six weeks. This is done in a refrigerated room at 32° to 35° F. The only air circulation around the bundles is that provided in the alleys between the pallets on which the bags of trees are stacked. In the case of large lots of stock, the space between stacks of bags is very limited. No evidence of heating, under these conditions, has yet appeared.

The bags offer their greatest advantage in shipment. They may be transported in open trucks or pickups, provided the weather is not unusually warm. Common carriers find them preferable because they are dry packages and are easy to handle. One to two percent of the bags may be punctured with rough

TABLE 1.—BAG SIZES AND COSTS FOR VARIOUS SPECIES AND CLASSES OF PLANTING STOCK SHIPPED BY THE COL. W. B. GREELEY FOREST NURSERY

Species	Stock Class	Stock Size	No. seedlings	Bag dimensions—inches Gusset	Face width	Face height	Price per M bags[1]
Douglas-fir	1-0		1,000	9	14	16	$145
Douglas-fir	2-0	Avg.	500	9	20½	24	155
Douglas-fir	2-0	Large	500	11½	24	30	200
Noble fir	2-0		500	9	20½	24	155
Grand fir	2-0		500	"	"	"	"
Pacific silver fir	2-0		1,000	"	"	"	"
Sitka spruce	2-0		500	"	"	"	"
Western hemlock	2-0		500	"	"	"	"
Port Orford cedar	2-0		500	"	"	"	"

[1]Approximate 1958 prices, delivered at Nisqually, Washington.

handling, but this has resulted in minor damage to the stock. Evidence was accumulated in the season of 1957-1958 that the amounts both of peat and water can be materially reduced in this package as compared with the older band package. In fact, it is possible to eliminate the peat altogether. This has not been done because of the inconvenience this would involve for the planters, who depend on the packages for the moist peat for their planting bags. Even with enough peat for the planters, it is possible to ship trees, in good condition, up to 2 or 3 pounds lighter per M than in the band package. This can amount to a considerable saving where trees are shipped 300 miles, as is the case with much of the stock grown in the Greeley Nursery, and helps to offset the slightly higher cost of bag packaging.

Planters find the bags easier to store, handle, and carry than the band package. Moreover, as dry packages with large surfaces, they can be marked with lot designations indelibly and with little risk of losing the identity of their contents. Partly-emptied bags can be easily closed to protect the stock. Many planters find that they can successfully dispense with heeling-in, provided the bags are kept in a shady cool place. Some used bags have been returned to the nursery and re-used successfully. In certain circumstances, this practice could effect a material saving.

Discussion.—Since bag packaging is a radical departure from the "open tops" method of packing, the conditions under which it has succeeded should be kept in mind by planters who may wish to try it. First, it has been applied only to the commercial timber species of the Pacific northwest. No appreciable quantities of pines have been packed by this method. Second, the cool, rainy planting season characteristic of the Pacific northwest facilitates the successful handling of planting stock, regardless of package. Third, the majority of the Douglas-fir stock so packed by the Greeley Nursery has been top-sprayed with ZAC or TMTD rabbit repellents, which are also fungicides. The significance of this treatment in preventing mold growth is as yet undetermined. Fourth, granulated Canadian horticultural peat has been used as a moisture-holding medium about the roots. This material is not commonly used in other nurseries of the Pacific Northwest. Deffenbacher and Wright (*2*) have shown that the type of moisture holding medium has a distinct effect on the development of molds on stored planting stock. Fifth, the Greeley Nursery packaging system, with the roots of 50-seedling bunches wrapped in water-proof paper, may offer some advantages over bulk packing of roots.

The development of molds on stored conifer planting stock has caused a good deal of concern to nurserymen. Deffenbacher and Wright (*2*) attribute this to storage temperatures above 35° F, contact of trees with wood in crates, or restriction of air circulation about the tops. Our experience indicates that storage in completely-closed bags results in freedom from molds provided the temperature is kept between 32° F and 35° F. This temperature range corresponds to that found optimum by Fowells and Schubert (*3*) for ponderosa and Jeffrey pine.

Literature Cited

1. ANONYMOUS. 1954. Operations manual for TVA forest nurseries. TVA Division of Forestry Relations. 57 pp.
2. DEFFENBACHER, F. W. and E. WRIGHT. 1954. Refrigerated storage of conifer seedlings in the Pacific northwest. Jour. Forestry 52:936-938.
3. FOWELLS, H. A. and G. H. SCHUBERT. 1953. Planting stock storage in the California pine region. Calif. For. and Range Expt. Sta. Tech. Paper 3. 12 pp.
4. MAHLSTEDE, J. P. 1954. Handling evergreens for shipment. American Nurseryman. 100 (8):12-13, 88-96.
5. MULLIN, R. E. 1956. Moisture retaining materials for nursery stock packaging. Ontario Dept. of Lands & Forests. Research Report No. 34. 43 pp.
6. STOECKELER, J. H. and G. W. JONES. 1957. Forest nursery practice in the Lake States. U. S. Dept. Agric. Agriculture Handbook No. 110. 124 pp.
7. WAKELEY, P. C. 1954. Planting the southern pines. U. S. Dept. Agric. Agriculture Monograph No. 18. 233 pp.

JOHN W. DUFFIELD
and REX P. EIDE
Technical director and nurseryman, respectively, Col. W. B. Greeley Forest Nursery, Industrial Forestry Assn., Nisqually, Wash.

Loblolly Pine Seed Production and Seedling Crops in the Lower Coastal Plain of South Carolina

Studies at the Santee Experimental Forest show a consistently high annual yield of seed from 35- to 50-year old stands of loblolly pine (*Pinus taeda* L.). One study, begun in a 35-year-old stand, showed an annual seedfall for the next 10 years in excess of 200,000 viable seeds per acre in every year except one.[1] Two 50-year-old stands of loblolly each produced over 1.5 million sound seeds per acre during a 5-year period, with production ranging from 100,000 to 700,000 sound seeds per year.

In the face of such enormous seed production one might conclude that natural regeneration of loblolly pine in the Lower Coastal Plain of South Carolina presents no serious problem. In a sense this is true. However, a heavy annual loss of seed to birds, rodents, insects, fungi, and the elements complicates the picture.

In the two 50-year-old stands we found that in most years from 84 to 98 percent of the viable seed did not germinate or was lost to predators (Table 1). Even in the best year over half the seed was lost. Fortunately, there is generally enough seed to produce a good catch of seedlings, and in this study there were never less than 3,000 seedlings per acre at the end of the first growing season.

[1]Lotti, Thomas. Good seed production from a young stand of loblolly pine. U. S. Forest Serv. Southeast. Forest Expt. Sta. Res. Note 97, 2 pp. 1956.

TABLE 1.—COMPARISON OF SEEDFALL IN TWO 50-YEAR-OLD LOBLOLLY PINE STANDS, SANTEE EXPERIMENTAL FOREST

Seedbed treatment	Seed Year	Sound seed per acre	Protected quadrats		Unprotected quadrats	
			Germination	Seed losses	Germination	Seed losses
		Thousand	*—Percent—*		*—Percent—*	
Stand 1						
No special site preparation	1952	164	27	73	10	90
	1953	320	41	59	8	92
	1954	405	10	90	2	98
	1955	542	51	49	13	87
	1956	98	16	84	6	94
	Average	306	29	71	8	92
Stand 2						
Annual summer prescribed burn	1952	101	65	35	12	88
	1953	240	62	38	16	84
	1954	361	19	81	4	96
	1955	696	80	20	42	58
	1956	113	45	55	7	93
	Average	302	54	46	16	84

FIG. 1.—A seedtrap and a protected quadrat (right) located in Stand 1. Also shown is condition of seedbed about 60 days after fifth annual prescribed burn.

Briefly, the study reported on here began in 1951 on the Santee Experimental Forest in two neighboring 50-year-old loblolly pine stands. Stand 1, under management, had improvement cuts in 1946, 1951, and 1956. There was no seedbed preparation in this area except that hardwoods 2 inches d.b.h. and larger were poisoned to enlarge openings. Stand 2 remained uncut; however, from the start of the study in 1951, the area was subjected to annual prescribed burns in mid-August. As a consequence, much of the understory brush and the forest litter was eliminated, thereby creating an excellent seedbed.

Seedfall estimates were made by means of ten ¼-milacre seedtraps randomly located in each area. Seedling counts were based on two ¼-milacre quadrats located near each seedtrap (Fig. 1). One of each pair of quadrats was protected from rodent and bird depredations by means of a wooden frame imbedded in the soil and covered with ¼-inch-mesh hardware cloth. Seedling counts were made at weekly intervals during the early growing season with a final count in the fall.

Within the framework of this study it is impossible to single out and fully evaluate each factor contributing to seed losses. However, there are some clues to the relative importance of certain factors. Easiest to assess are the losses from rodents and birds. They may be judged by comparing the difference in germination between the protected and the unprotected quadrats. In Stand 1 this comparison indicates an average loss of 21 percent of the viable seed to rodents and birds in 5 years. In Stand 2 the average loss was even greater, amounting to 38 percent of the

seed. This greater loss was probably caused by the more exposed position of the seed on the burned seedbed.

The importance of adequate moisture to germination and seedling survival is apparent but difficult to evaluate in this study. In the main, fewer seeds per seedling were needed on the moister, mineral soil of the burned seedbed and also in years of good rainfall, especially those lacking a dry period in the early growing season. For the 5-year period, for example, in the protected quadrats an average of only 5 viable seeds was needed to establish one seedling on the annually burned area of Stand 2.[2] In contrast an average of 10 seeds was needed on the unprepared seedbed of Stand 1.

A spring drought could appreciably raise seed requirements. This happened in March 1955 when only 0.25 inch of rain fell. In spite of ample rainfall, 3.80 inches or more, during the ensuing months of the growing season, the burned seedbed required 26 seeds per seedling and the unprepared area needed 51 seeds, or about 5 times above the average. On the other hand, there was no early spring drought in 1956. March rainfall amounted to 2.72 inches and in the following growing season ranged from 2.12 inches in May to 5.78 inches in September. Apparently the amount and distribution of this rainfall was particularly suited to seed germination and survival, since only 3 seeds were needed per seedling in Stand 2 and 8 seeds in Stand 1. Assuming that insect and disease losses were relatively the same in 1955 and 1956, these comparisons emphasize the importance of moisture to seed germination under field conditions. To pinpoint it further, as we have for rodents and birds, is beyond the limits of available data.

In spite of the indicated heavy annual loss of seed, sufficient seedlings were produced in both stands to adequately restock the respective areas if the decisions had been made to harvest cut in any one of the years involved (Table 2). According to Trousdell[3] from 3,500 to 5,000 seedlings per acre are needed for a 90-percent stocking in the Coastal Plain. Therefore, high levels of stocking would have been quite certain in both areas.

From this study we have some evidence that many loblolly pine stands in the South Carolina Coastal Plain probably could be adequately regenerated without the benefit of residual seed trees, if cut after seedfall. Generally the risk of failure would increase with the depth of the litter and the density of the understory hardwoods and brush. This risk could be reduced with a program of prescribed burning in the years prior to harvest. Any additional cultural measures could be prescribed as needed.

TABLE 2.—ANNUAL SEEDLING CATCH AT END OF FIRST GROWING SEASON IN TWO 50-YEAR-OLD LOBLOLLY PINE STANDS, SANTEE EXPERIMENTAL FOREST

Seedbed treatment	Seed year	Protected quadrats Living seedlings[1]	Protected quadrats Dead	Unprotected quadrats Living seedlings[1]	Unprotected quadrats Dead
		M per acre	*Percent*[2]	*M per acre*	*Percent*[2]
Stand 1					
No special site preparation	1952	15	9	18	7	4	6
	1953	51	16	25	6	2	6
	1954	8	2	8	4	1	1
	1955	70	13	38	22	4	9
	1956	8	8	8	3	3	3
	Average	30	10	19	8	3	5
Stand 2					
Annual summer prescribed burn	1952	21	21	44	6	6	6
	1953	53	22	40	14	6	10
	1954	14	4	15	4	1	3
	1955	250	36	44	195	28	14
	1956	22	19	26	4	4	3
	Average	72	20	34	45	9	7

[1]The numbers of seedlings given are those living at the end of the first growing season following the specified seed year. For example, the 1952 seed year involves germination and survival during the 1953 growing season.
[2]Percent of sound seeds per acre.

[1]Column 3, Tables 1 and 2.

[3]Trousdell, Kenneth B. Seed and seedbed requirements to regenerate loblolly pine. U. S. Forest Serv. Southeast. Forest Expt. Sta. Paper 8, 13 pp. 1950.

THOMAS LOTTI and
W. P. LEGRANDE

Southeastern Forest Expt. Sta., Forest Service, U. S. Dept. Agric., Charleston, S. C.

Points of View

Forest Fire Control and Forestry Education

Seventeen years ago, George Jemison used the pages of the JOURNAL OF FORESTRY to plead for increased attention to the science of forest fire control on the part of forestry educators.[1]

These 17 years have seen no diminution of the fire problem. To the contrary, more attention and effort is being paid to fire control and use; and fire appears destined to play an ever more important role in the forester's activities as forest management becomes more intensive.

What are the current needs of fire control organizations for trained personnel? To what degree are the forestry schools of the country meeting these needs? And what is the function of the forestry schools in providing the necessary training?

In 1942, Jemison found it necessary to decry the then-prevalent attitude that fire protection is a subject not worthy of inclusion in the technical forestry curriculum, but one which could best be learned "on the job." Although some of this attitude may still prevail, it is not widely shared by professional fire control people. A moment's reflection will reveal the absurdity of this view. Even if the best way to learn the fire-control task were through on-the-job training and practical fire experience, it is obvious that the more efficient the fire control organization became, the less opportunity there would be for the necessary experience. But why should fire control be considered to be a sort of subprofessional job for which a few hours of "experience" can qualify one? Fire is an extraordinarily complex natural phenomenon. Does it make sense to say that increased scientific and technical knowledge of fire behavior will have no effect on the efficiency of control efforts? This is not the record of any other area of technical human endeavor and there is no reason to believe that it would be true of fire control.

What, then, do fire control organizations need in the way of trained personnel? What sort of training do these people need? And what can trained personnel do for the fire control organization? Now, the field of fire control is so broad that general answers to these questions cannot be given. But I would like to outline what I believe to be some of the needs in the field of fire behavior.

The combustion process is an exceedingly complex and little understood process. Browne, in a recent synthesis of knowledge about the combustion of wood,[2] indicates that although "substantial progress has been made in reaching an understanding of the fundamental mechanisms of the pyrolysis and combustion of wood," much of the knowledge has come through empirical efforts, and that "it is high time that the objective (of developing fire retardants) be sought from the point of view of fundamental principles (of combustion)." Much more is known about combustion and fire behavior, however, than is commonly a part of the fire control man's store of information. When human lives are at stake, who is willing to take the responsibility to say that such knowledge is relatively unimportant, and can be picked up in a few hours of on-the-job training, or through experience on a few fires? In terms of dollars saved—in suppression costs or damage—a little extra knowledge in the right place will pay for itself many times over. I do not think we have reached the point of diminishing returns in this regard.

Here, then, is the first major need of fire control organizations: better training of all line personnel in fire physics and fire behavior, and superior training of at least a few fire behavior specialists. Let me emphasize that I am talking about line personnel—those engaged in actual fire control activities, not research or administration.

If fire physics and combustion are one side of the behavior coin, then the weather is the other side. The weather, in its infinite variations in both space and time, exerts the major "variable" influence on fire behavior. How many men have been killed on fires recently because of unexpected changes in weather variables? *Unexpected* but not necessarily *unexpectable*. How many of these men would be alive today, if fire-weather specialists had been on the ground and actively engaged in analyzing current and expected weather on *all* Class C and larger fires?

When I speak of a fire-weather specialist, I am not talking about a fire-weather forecaster, whose job it is to produce useful forecasts of fire-weather variables. I am talking about specialists trained and experienced in both weather and fire behavior. These men will have to be more than fire-weather forecasters. They must be able to analyze fire situations in terms of actual and probable future effects on the fire of large- and small-scale weather patterns. They must be a constant part of the fire control organization, not a fellow who is called in when the going is rough, and the damage, perhaps, already done.

Of course, if the fire-weather specialist is to be able to function

[1] Jemison, George M. The place of fire protection in forest education. Jour. Forestry 40:834-836. 1942.

[2] Browne, F. L. Theories of the combustion of wood and its control. A survey of the literature. Forest Products Laboratory. Rept. No. 2136. 59 pp. December 1958.

efficiently, he must be able to communicate his knowledge to other members of the fire control team. This implies that all fire control personnel should have considerably better training in meteorology than most foresters now have.

If these are the needs, at least in the limited fields to which I have addressed myself, how are these needs being met?

In the article previously referred to, Jemison found that 4 out of 21 forestry schools checked required no course in fire protection. Of the 17 that did, 8 included other aspects of forest protection, such as disease, insects, and so forth. Has the situation improved? Today, all accredited schools must offer work in "forest protection." Of the 27 such schools, however, 9 are still offering polyglot courses that include all manner of curious bedfellows. Of the 11 non-accredited schools included in the annual survey of forestry school statistics,[3] three offer a fire control course, six a combined course, and two no course at all.

It is not possible to say how effective these courses are. However, there are certain indications which may provide clues as to the status of fire control education today. Of the 27 accredited forestry schools, only 6 offer more than one course in fire, at the undergraduate or graduate level. In a questionnaire prepared by the Society's Study of Forestry Education designed to elicit opinions on curricula, only two formal fire courses could be designated: applied fire control and fire meteorology. Photogrammetry merited four choices. In another survey conducted by the same committee, forestry teachers were asked to designate their areas of primary specialization. The closest area to fire control was that of "protection," which includes protection from fire, insects, disease, wildlife, wind, and weather; and presumably does not include *use* of fire. In yet another indicator, that of research, very little published research on fire comes from the forestry schools. And until this year, no hard-cover textbook devoted solely and comprehensively to fire control was available.[4]

All of this adds up to a rather sorry picture of the academic side of fire control education. What are the fire services themselves doing?

Here the picture is beginning to brighten. The U. S. Forest Service is beginning to recognize the importance of trained experts in the fields of fire behavior and fire weather. The new table of organization includes a fire-behavior expert on the fire boss's staff. And consideration is actively being given to the inclusion of fire-weather specialists in the fire organization. Recognizing the inadequate level of preparation of their personnel in these fields, the Forest Service has conducted its own national training schools in fire behavior. The first of these training schools was held last year in Missoula. It was a five-week intensive program of training in the fundamentals of combustion, fire behavior, and meteorology. The most significant thing to me is that the training program was highly fundamental and scientific in its approach, rather than purely "practical," as so many field training programs are. Despite the expense of such a school, the Forest Service was sufficiently impressed with the results to hold a second this year, with probably more to come.

There are other bright signs. Fire research is receiving increased attention by a number of agencies. The new forest fire research laboratory sponsored jointly by the Forest Service and the State of Georgia will be in full operation in the very near future. Plans are well advanced for a federal forest-fire research laboratory in Missoula. Expenditures by other Forest Service research agencies have increased substantially in the past few years. And in another area, the Committee on Fire Research of the National Academy of Sciences-National Research Council, established less than five years ago, has recently started publishing an abstracting journal.[5]

What can and should be done to stimulate more adequate teaching and research in fire control? Whatever is done certainly has to be a joint effort of all agencies involved. The Forest Service is to be commended in establishing specialist positions and urged to include a fire-weather specialist in its table of organization. It is essential that students be made aware that these positions exist, for some of them must be motivated to specialize in fire control. The Forest Service can stimulate interest in better teaching and research by apportioning part of its fire-research funds to the forestry schools for fire research projects. This would have the double effect of helping to reduce the shortage of fire research personnel and at the same time raising the level of fire education in the schools where this research was being carried on.

The schools, for their part, have a major task to perform. First of all, there must be a re-orientation of thinking on their part. We cannot afford any longer to consider fire control as a sub-professional subject, to be taught on a purely "practical" level by a faculty member whose main qualification for the task is his availability. We need teachers who are specialists in fire control, who have enough time to carry on at least a modest amount of fire research.

It seems to me that we must also get away from the idea of "protection" as an all-inclusive term for anything that may cause damage to the forest. In the first place, it covers too many diverse subjects which are included in a single course only because they all relate to damage. It is a little bit like teaching how to grow apples and

[3] Marckworth, Gordon D. Statistics from schools of forestry for 1958: degrees granted and enrollments. Jour. Forestry 57:111-116. 1959.

[4] Davis, K. P. Forest fire: control and use. McGraw-Hill Book Company, New York. 584 pp. 1959.

[5] Fire research abstracts and reviews. Division of Engineering and Industrial Research, National Academy of Sciences, National Research Council, Washington, D. C. Vol. 1, No. 1, was published Sept. 1958.

(*Continued on page* 586)

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onions in the same course because they are both round. Secondly, the term "protection" is misleading when applied to fire. To be sure, protection from fire is an important facet of the fire control job. But so is the use of fire in land management. To call both of these activities "protection" leads to serious semantic and logical difficulties. And thirdly, the field of fire control is too large and complex to do justice to it in a portion of another course.

In addition to one good basic course in fire control, some schools should give thought to including advanced course work in fire in their curriculums. Logically, these schools might be ones in regions where fire is an especially important problem. They should also be schools with adequate curricular support in meteorology, engineering, physics, and mathematics. It seems not unreasonable to expect that at least one forestry school in each of the major regions of the country—Southeast, Northeast, Lake States, Rocky Mountains, and Far West—take on the task of developing a specialized program in teaching and research in fire.

Here then are at least some of the needs in fire control, and a few suggestions on how we might cope more adequately with these needs. But are there specific measures that those with an interest in these ideas can take? Would a conference of educators and forest-fire administrators help? Should the Society take a stand in this matter? There are certainly many individual or collective things that might be done. What the most effective are, I don't know. So, I would like to invite suggestions and comments from you who have a stake in the problem. If there is enough interest, perhaps something can be done.

WILLIAM E. REIFSNYDER
Yale School of Forestry

A Comment on Professional Methods

Wherever foresters gather the discussion is bound to focus at some time or other on the professional stature of forestry. Much has been said on this subject—with varying viewpoints brought out—but I was impressed, while participating in such a discussion recently, by an observation of one member of the group. He stated:

"A profession is said to be a body of persons which is organized into an association that assumes responsibility for maintaining and improving the quality of its service, which has had specialized and prolonged study and training, and which serves important needs of people. But a *true profession* must have something more. *It must have methods and an attitude which cloak the group in a mantle of authority.* Or, more pointedly, a true profession must have methods which generally are unavailable to the layman, and which the profession uses, and believes in. Thus, to answer the question 'Is forestry a true profession?' one must first answer the question: Can forestry meet this final requirement?"

It was agreed that the "final requirement" was an excellent gage of the strength and esteem of a profession, but that it is more realistic to consider the requirement as essential to the "high rating" professions than a requirement for all. Invariably, professions which "have methods and an attitude which cloak the group in a mantle of authority" are strong and highly regarded; professions which rate low in this respect have less strength and esteem. I venture to say if we could use number symbols to rate such things, we would find as a profession improves its methods and attitude, its strength and esteem increases in some sort of a geometric progression.

Without going into more detail, I think most foresters will agree that in terms of strength and esteem it pays a profession to increase its rating on the "final requirement." But have we foresters done this? We have developed, and are continuing to develop, valuable professional methods which are honestly out of reach of the layman. But are we making full use of them? Are we inclined to simplify these methods and techniques until they lose their worth? Or do we dismiss them as impractical because the owner or the public cannot understand them, or because they require personnel with a strong professional background to understand and apply?

This reminds me of a story involving two foresters, one with but a few years' experience, the other with 25 years behind him. The younger man who had given much thought to methods of taking forest inventories made some suggestions in this area to the older man. "Your methods sound ok," said the old timer, "but when you have had my experience, you will know they are not practical." Replied the younger forester, "But you have not had experience; all you have had is repetition." . . . How many foresters are mistaking repetition for experience; obsolete methods for professional methods?

Most of us agree with Dr. Garrett's statement in the July 1958 Council's Column: "Forestry still fails to share the general public understanding and regard enjoyed by engineering and other recognized professions." But I fear we feel that status is a problem to be solved mainly in terms of advertising and public relations. But this has not been the case with engineering, and law, and medicine. Such professions have gained strength and esteem mainly through the development and *use* of valuable professional methods. Is there any reason it should be different for forestry?

C. I. MILLER
Purdue University

Book Reviews

Fruit Key and Twig Key to Trees and Shrubs; Fruit Key to Northeastern Trees; Twig Key to the Deciduous Woody Plants of Eastern North America

By William M. Harlow. 50 and 56 pp. Illus. Dover Publications, Inc., New York. $1.25.

Reprinting of these two popular keys conveniently together in one paperbound volume will make them more widely available to numerous persons wishing to identify trees in winter or detached tree fruits. This inexpensive field reference is an "unabridged" and almost "unaltered republication" on good quality paper of one key published by the author in 1946 and the fourth edition of the second, dated 1954.

Coverage of the two keys is slightly different. The first, to tree fruits, properly includes the conifers, though technically without true fruits; the second omits evergreens but adds some shrubs and woody vines.

"Eastern North America" seems broad for the title of a key whose range coincides mostly with that of Gray's "Manual of Botany," or south to southern boundaries of Virginia and Missouri. "Northeastern" in the other title apparently covers the same area. Most native tree species in northeastern United States are included, though a few groups of closely related species are not separated. Several common ornamental or naturalized species have been added.

The keys are well illustrated with more than 300 excellent photographs, nearly all from "Textbook of Dendrology," by the author and Ellwood S. Harrar. Unfortunately, the photographs are not labeled. Those who like to identify by looking at the pictures must hunt in the key by number to find the name. It is confusing to have two series of numbers, one for the names and illustrations and the other for steps of the parallel key.

In response to the invitation for suggestions, the reviewer much prefers instead the indented key, which is found in most botanical manuals. The indented key is easier to follow, especially to backtrack and to try different forks when the character is uncertain or the specimen incomplete. It would save time to divide the long key at the beginning into a few main subheads and keys, where the users could start, such as "Fruit a cone," "Fruit winged," "Fruit fleshy," etc.

ELBERT L. LITTLE, JR.
Division of Forest Management Research, U. S. Forest Service, Washington, D. C.

Birds of Alaska

By Ira N. Gabrielson and Frederick C. Lincoln. 929 pp. Illus. The Stackpole Co., Harrisburg, Pa. 1959. $15.

Seldom, if ever, in ornithological history has the publication of a great book on birds coincided with statehood for the great land with which the book is concerned. *Birds of Alaska* has this distinction.

Birds of Alaska attains greatness on at least three counts: 14 years of study and research on the part of two of America's top bird men; definitive coverage (to date) of the new, vast, and fabulous state; and the assemblage of knowledge, surprisingly extensive, on Alaskan ornithology (history, migration, range, distribution, ecology, and bibliography) between the covers of a single volume. The bibliography of approximately 900 titles suggests the scope of the work.

There are other attributes of distinction. The illustrations, with two minor exceptions, are original paintings by E. R. Kalmbach and O. J. Murie. These color plates, five by each artist, are in ecological settings, and they are good (though "faded" in reproduction in some instances). "Topography of a Bird" by Bob Hines is standard, and departs from the conventional passerine! The map showing regions referred to in the 22-page gazetteer of Alaskan place names is highly useful to readers unfamiliar with Alaskan geography (certainly the great majority!). This section was laboriously prepared by Myra A. Putnam.

The frontispiece, a painting of the Alaskan bald eagle by Kalmbach, is titled "juvenile" and "adult" here, but "winter and summer" in the list of illustrations. Inclusion of migration and life-zone maps, both the subject of chapters in the book, would have enhanced these excellent treatments.

The great bulk of *Birds of Alaska* is devoted to the description, general range, Alaskan range, and the haunts and habits of the 321 species and 414 races included, constituting 773 of the 922 pages, or 84 percent of the text. For most of the species this treatment of the range, haunts, and habits is detailed, aggregating all of importance presently known of the Alaskan avifauna. In addition to descriptions of adult and immature males and females for nearly all species, there are brief descriptive treatments of nests and eggs. Descriptions are largely compiled, with generous reference to the literature. This 773-page section is designated in the Contents as "The Birds of Alaska" but, in the text, it begins simply with the heading, "Family Gaviidae—Loons."

"Some Interesting Aspects of Alaskan Ornithology" is, to the reviewer, the most notable and informative chapter of the book. The main theses are: (1) Alaska is rela-

tively rich in water birds and relatively poor in land birds (159 versus 162 species, respectively), whereas, in land areas to the south (California), water species represent only about 40 percent of the total, and less than 30 percent of the 644 species and subspecies. (2) Of the 414 Alaskan races, 104 (25 percent) are classified as casuals or accidentals, considered unusually high. Of these wanderers, 56 forms are Old World birds, while 48 are New World species or subspecies. The geographical position of Alaska—the "land bridge" between the two worlds—would appear to explain this phenomenon. (3) Many recognizable races have developed among the more plastic species in comparatively small areas. Thus, on the Aleutian Islands, the rock ptarmigan, a bird of arctic origin, is represented by seven races. The winter wren, the song sparrow, and the fox sparrow also show this characteristic to a pronounced degree. The authors imply, at least for the rock ptarmigan, that enforced isolation on relatively small islands separated by wide stretches of water accounts for sub-speciation in this instance.

To many, the first chapter of the book, "History of Alaskan Ornithology," will undoubtedly be of great interest and value. Concerned with explorations and expeditions dating back to the Russian discovery (1741), this 29-page section is built mainly around the travels of the scores of government officials, explorers, traders, and others who have plied Alaska and its adjoining waters. Their accounts, associated with the many species of birds collected, described, or reported, constitute a most valuable summary—indeed, the history of Alaskan ornithology. Many of these accounts are recent, including the extensive Alaskan travels of the senior author.

The book is well indexed, and common and scientific names are cross-referenced. Acknowledgements are generous and involve many individuals, including several Russian authorities. The inclusion of native names for a large number of species is a feature of interest.

In manufacture, *Birds of Alaska* is well done. It is durably bound, with backstrip; and the print, in two sizes and on enameled paper, is relatively easy to read. The jacket, featuring a colorful Kalmbach painting of puffins and auklets, is unusually attractive.

Birds of Alaska is another of the now lengthy list of publications of the Wildlife Management Institute.

Detailed and authoritative presentation, unusual timeliness, the series of excellent paintings, and the remarkably complete history and bibliography suggest that *Birds of Alaska* will be the great bird book of 1959. It would be a great bird book in any year.

LEE E. YEAGER

❦ ❦ ❦

Poplars in Forestry and Land Use

511 pp. Illus. Food and Agriculture Organization of the United Nations, Rome. 1958. $3.50.

Many European poplar experts collaborated to discuss poplar culture and utilization in *Poplars in Forestry and Land Use,* prepared by the Standing Executive Committee of the International Poplar Commission at the request of FAO. The book is an essential reference work for the forester and layman interested in growing poplar for timber use. It covers the identification and distribution of poplars; their cultivation in the nursery, in rows, in plantations, and natural forest stands; animal pests and diseases; genetics and breeding; and the characteristics of the wood and its utilization.

The section on the naming and distribution of poplars is generally very good, but there are some points, such as the following, to which this reviewer must take exception. The collective Latin name *P.* X *canadensis* Moench, for hybrids derived from *P. deltoides* X *P. nigra*, has been rejected in favor of the name *P. euramericana* (Dode) Guinier. There is no sound reason for rejecting the name *P.* X *canadensis* Moench[1]; and if there were, then the International Code of Nomenclature would require the next oldest name, perhaps the name *P.* X *serotina* Hartig.

Three subspecies of *P. deltoides* (eastern cottonwood) are recognized in this publication, *angulata, missouriensis,* and *monilifera;* there is at present insufficient information to substantiate these taxonomic conclusions.

Populus candicans Ait. is listed as a natural species with the remark that it is "only known as a female tree." This cultivar of *P. balsamifera* L. does not rate specific rank.

On the basis of very limited trials of only a very few clones in Europe, the statement referring to *Populus balsamifera* that "the cultivation of this tree outside its natural distribution does not seem promising" is very premature.

The discussion of poplar cultivation is an excellent compendium of European practices. The three essential soil factors which determine the success of poplars are: (1) good aeration; (2) good water supply; (3) good mineral content. The cultivation of poplars in mixture with other forest species and the planting of poplars in combination with agricultural or forage crops is very well described. Planting methods, site preparation, fertilizers, spacing for plantations, row plantings, and shelter belt plantings, pruning, pruning tools, and climbing apparatus are also adequately covered.

There is a section on the management of poplar in alluvial forests that will be of interest to American foresters working with our cottonwood. An interesting discussion of the characteristics of "forest soils" and "poplar soils" is included.

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[1]Boom, B. K. *Populus canadensis* Moench versus *Populus euramericana* Guinier. Acta Bot. Nederlandica 6: 54-57. 1957.

There is considerable information on costs and returns in the Netherlands, southern Spain, France, and Italy. Predictions of costs and returns from poplar in the United States on the basis of these European data should be made with extreme caution for the following reasons: (1) European figures based on the use of relatively cheap hand-labor and proportionately high prices for timber products cannot be converted for American conditions with sufficient accuracy to justify their use; (2) costs and returns in the United States will depend in large measure on the extent to which poplar production can be successfully mechanized.

The section on animal pests and diseases is particularly complete and well illustrated. This section will be of interest to all poplar growers in the United States.

Under the heading of genetics and breeding, this publication includes a general section on the genetic and biological facts of importance for poplar breeding with emphasis on photoperiodic reaction, disease resistance, and polyploidy. Breeding methods, selection, propagation of hybrids, and testing methods are also discussed. The appendix to this section lists 24 organizations engaged in research on the genetics and breeding of poplars.

The final section of the book is on the characteristics of poplar wood, its exploitation and utilization. There is very good presentation of the technical properties of poplar wood, including both physical and chemical characteristics. Methods of harvesting are discussed and the defects of poplar wood are clearly described and illustrated by numerous good pictures. The many uses of poplar wood are briefly described.

ERNST J. SCHREINER
Northeastern Forest Experiment Station

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The Ghost of North America

By Bruce S. Wright. 140 pp. Illus. Vantage Press, New York. $3.50.

No longer does the eastern panther have to assume only a ghostly form around sportsmen's campfires along the Atlantic coast. Mr. Wright's keen interest and untiring efforts in collecting and analyzing reports have definitely established the presence of this animal, generally considered extinct since the early 1900's, in at least part of its original range.

The origin and history of these big cats is traced from primeval times to the present day. Their decline before an advancing civilization is explained, as is the all important change in public attitude which recognized wildlife as an asset and indirectly saved the remnant panther population by permitting restoration of deer and other animals which constitute its principal food. But the cats have had to adapt themselves to an entirely new set of conditions in order to survive. The result is their great caution and nocturnal habits which have kept them practically unseen for half a century.

For those who refused to believe the infrequent reports of panther sightings, now increasing from nearly all parts of the range, Mr. Wright submits detailed records of 28 encounters in the New Brunswick-Maine-Vermont area. Thus, the gap is bridged between the small population of the present and their "exterminated" ancestors of the early 1900's.

Modern methods of hunting panthers for study are outlined. The need for information from an understanding public is stressed, and interesting material on the big cats' habits is accompanied by photographs and sketches of tracks, scrapes, and typical panther kills. The author has had to draw on records of the much more abundant western subspecies, the mountain lion or cougar, for some of this material, but reference is also made to the tracking and hunting of big cats in other parts of the world.

A reconstruction of seven months in the life of a young panther which caused the usual scare headlines in New Brunswick newspapers demonstrates the application of study techniques to individual case reports. The complete lack of justification for such public hysteria is emphasized throughout the text, as is the fact that panthers can be present in an area without greatly disturbing man or damaging game populations.

Individual panthers, usually the very old or the young and inexperienced, are sometimes forced to feed on domestic stock. But an enlightened approach to any predator control will remove the trouble makers without condemning the species as a whole. The eastern panther is much too rare to be shot just to prove that there is one. It deserves recognition as a fine game animal, a status already accorded the southern subspecies in Florida; and the real need is for "a census of the living, not a record of the dead!"

The accuracy of Mr. Wright's forecasts are borne out by the taking of a mountain lion in South Dakota, the first since 1930, after his book went to press. Analysis of 94 eastern observations show most sightings in summer and fall along motor roads between 6 and 9 p.m. Your chances of ever seeing a panther are still very small; but if you roam the out-of-doors at all, probably the greatest contribution of this book is the knowledge that someday you too may be able to report, "Jeeze, Mr. Wright, I seen a cooger!"

DUNBAR ROBB
Missouri Conservation Commission

An Outline of Photogrammetry

By K. Schwidefsky. Translated by John Fosberry. 326 pp. Illus. Pitman Publishing Corp., New York, Toronto, and London. 1959. $13.

Dr. Schwidefsky's photogrammetry text was first published in German in 1936. The English translation is based upon the fifth edition of 1954. Since the book had previously been published in Japanese and Spanish, it certainly qualifies as one of the standard texts on the science of obtaining accurate measurements through photography.

Dr. Schwidefsky, formerly professor at Dresden Technological University, is permanent scientific consultant to Carl Zeiss and to Zeiss-Aerotopograph, among the principal manufacturers of lenses, aerial cameras, and photogrammetric equipment in the world. He is thus in a unique position to be acquainted with the present state of knowledge of photogrammetry and photogrammetric equipment. The book is completely authoritative and unquestionably falls into the first rank of textbooks on the subject of photogrammetry. It is complete, detailed, and up to date.

As is usual in photogrammetric works, the analysis of vertical aerial photographs is of principal importance and is given the major share of attention. Schwidefsky's book, however, also emphasizes the elements of photogrammetry, and covers at least briefly both terrestrial topographic photogrammetry and close-up photogrammetry. Applications to such fields as forestry, geology, soil science, and engineering are given acknowledgment but little coverage.

The book is definitely intended for professional photogrammetrists and contains much material of little or no interest to foresters and others working with photographs but who are not full-time specialists in precision mapping procedures. As a result, *An Outline of Photogrammetry* may well qualify as a key reference work for forest photogrammetrists, but has little to offer as a forestry text for undergraduates or for the forester whose primary concern is with the simple techniques and procedures of the field.

STEPHEN H. SPURR
The University of Michigan

George Perkins Marsh, Versatile Vermonter

By David Lowenthal. 442 pp. Illus. Columbia University Press, New York. 1958. $6.50.

Lowenthal's biography of George Perkins Marsh provides excellent source material for foresters, conservationists, and ecologists interested in tracing 19th century thought on multiple-use management in the United States. It gives the background and development of ideas of the man who wrote *Man and Nature; or, Physical Geography as Modified by Human Action*, New York, 1864; final revision, 1885. Gifford Pinchot, in his *Breaking New Ground*, states that Marsh's "epoch-making book . . . led me along the path a little way" in the search for information on forestry.

Marsh was indeed versatile. He was born in Woodstock, Vt., on March 15, 1801, studied at Dartmouth, and practiced law at Burlington. His varied occupations included farmer, woolen manufacturer, editor, politician, and diplomat. He was Congressman for six years, during which time he was on the Select Committee which developed legislation setting up the Smithsonian Institution in 1846. He later served on the institution's Board of Regents. From Congress he went to Turkey as minister for five years, then spent the last 21 years of his life (1861-1882) as minister to Italy. He was all-inclusive in his interests, a tireless observer and writer, an expert linguist, and a steady collector and reader of books.

This biography is interesting but it is not easy reading. It is arranged in the chronological sequence of Marsh's life, with extensive quotations from his published and unpublished writings, and his correspondence with friends and acquaintances, all in the well-rounded, almost pompous style of the times. The book has all the details of Marsh's boyhood illnesses, his perpetual financial difficulties, his family tragedies and rewards, his fetishes on Puritans and Goths, his distaste for railroads and for the West, his political likes and dislikes, his scholastic achievements, and his contradictions of belief and utterance.

As the biographer states: "Marsh cannot properly be called a conservationist." He was devoted to too many other causes. His early life and upbringing in 19th century Vermont fostered an "omnicompetence" and versatility which, added to his later experiences and travels, led naturally to his work on *Man and Nature*.

The book is fully annotated with chapter notes and an impressive bibliography of manuscripts and published works which bespeak a tremendous amount of library research by the author.

R. S. CAMPBELL
Southern Forest Experiment Station

Publications of Interest

The *Glossary for Forest Tree Improvement Workers*, edited by E. B. Snyder, has recently been published by the Southern Forest Experiment Station for the Committee on Forest Tree Improvement of the Society of American Foresters. R. T. Bingham is chairman of the committee. The 22-page booklet contains terms selected and defined primarily for foresters and others interested or engaged in tree improvement work. Terms are chiefly those in general use by tree breeders but which may not be familiar to persons with a slight botanical background.

Copies are available upon request from: Southern Forest Expt. Sta., Forest Service, U. S. Dept. Agric., 704 Lowich Bldg., 2026 St. Charles Ave., New Orleans 13, La.

Current Literature

Compiled by MARTHA MEELIG, *Librarian, State University College of Forestry at Syracuse University*
Range Management Section Compiled by NELLIE G. LARSON, *Library, U. S. Department of Agriculture*

General

Atlas of Forestry in New York. By N. J. Stout. 95 pp. Illus. State Univ. College of Forestry at Syracuse Univ. 1959. Bul. No. 41. $2.50.

Forest Development on the Cumberland Plateau. 20 pp. Illus. TVA, Norris, Tenn. 1958. Rept. No. 222-58.

The National Parks. By A. H. Carhart. 289 pp. Illus. Knopf, New York. 1959. $4.75.

Program for the National Parks. By U. S. Forest Service. 26 pp. Illus. U. S. Dept. of Agric., Washington 25, D. C. 1959. Misc. Publ. No. 794. 15 cents (Govt. Print. Off.)

Christmas Trees

Christmas Tree Insect Control. By R. L. Janes, J. W. Butcher, and W. F. Morofsky. 44 pp. Illus. Michigan State Univ. Coop. Ext. Serv., East Lansing. 1958. Ext. Bul. No. 353.

Christmas Tree Purchasing Habits in Greater Cleveland, Ohio, 1957. By G. H. Mitchell. 11 pp. Illus. Ohio Agric. Expt. Sta., Wooster. 1959. Research Cir. No. 65.

Consumer Preferences for Christmas Trees and Natural Decorative Materials. By R. C. Brundage. 12 pp. Illus. Purdue Univ. Agric. Expt. Sta., Lafayette, Ind. 1959. Research Bul. No. 669.

Managing Scotch Pine for High Quality Christmas Trees. By John Haeskaylo, W. E. Goslin, and O. D. Diller. 11 pp. Illus. Ohio Agric. Expt. Sta., Wooster. 1959. Research Cir. No. 64.

Marketing Christmas Trees in Missouri. By L. K. Paulsell and J. M. Nichols. 23 pp. Illus. Univ. of Missouri Agric. Expt. Sta., Columbia. 1958. Bul. No. 719.

Production and Marketing of Plantation Grown Christmas Trees in Michigan. By L. M. James. 31 pp. Michigan State Univ. Agric. Expt. Sta., East Lansing. 1959. Spec. Bul. No. 423.

Conservation

Conservation Activities for Young People. By C. E. Fox. 20 pp. U. S. Forest Serv., Washington 25, D. C.

Farm Forestry

Selling Black Walnut Timber. By W. D. Brush. 17 pp. Illus. U. S. Dept. of Agric., Washington 25, D. C. 1959. Farmers Bul. No. 1459. 10 cents (Govt. Print. Off.)

Forest Economics

Some Economic Aspects of Ohio Forestry Over the Next Fifty Years: Paper Submitted to the Timber Committee of the Ohio Mid-Century Governor's Conference on Natural Resources, Columbus, Ohio, May 14, 1958. By G. H. Mitchell. 10 p. Free from Mailing Room, Ohio Agric. Expt. Sta., Wooster.

Forest Management

The Application of Unit Area Control in the Management of Ponderosa—Jeffrey Pine at Blacks Mountain Experimental Forest. By W. E. Hallin. 96 pp. Illus. U. S. Dept. of Agric., Washington 25, D. C. 1959. Tech. Bul. No. 1191.

Compact Solution of Simultaneous Equations by the Crout Method. By T. W. Beers and H. D. Siegworth. 12 pp. Purdue Univ. Agric. Expt. Sta., Lafayette, Ind. 1959. Research Bul. No. 675.

Point-Sampling and Line-Sampling: Probability Theory, Geometric Implications, Synthesis. By L. R. Grosenbaugh. 34 pp. Southern Forest Expt. Sta., New Orleans, La. 1958. Occasional Paper No. 160.

Forest Products

Idaho Lumber Production, 1956. By A. K. Wilson. 8 pp. Intermountain Forest & Range Expt. Sta., Ogden, Utah. 1958. Forest Survey Release No. 1.

The Marginal Sawlog for Southern Yellow Pine. By Milton Applefield. 24 pp. Texas Forest Serv. 1958. Research Note No. 21.

Montana Lumber Production, 1956. By A. K. Wilson. 7 pp. Intermountain Forest & Range Expt. Sta., Ogden, Utah. 1958. Forest Survey Release No. 2.

Forest Protection

Drought Estimation in Southern Forest Fire Control. 22 pp. Southeastern Forest Expt. Sta., Asheville, N. C. 1959. Sta. Paper No. 99.

A Partial Bibliography of Southern Forest Insects. By Members of the Southern Forest Insect Work Conference. Publ. thru the courtesy of Virginia Div. of Forestry. 1958.

Spruce Spider Mite Infestations in Northern Rocky Mountain Douglas-Fir Forests. By P. C. Johnson. 14 pp. Intermountain Forest & Range Expt. Sta., Ogden, Utah. 1958. Research Paper No. 55.

Range Management

Beef Cattle Investigations on the San Joaquin Experimental Range. By K. A. Wagnon, and Others. 70 pp. Illus. California Agric. Expt. Sta., Berkeley. 1959. Bul. No. 765.

Economic Evaluation of Seeding Crested Wheatgrass on Northern New Mexico Rangeland. By H. B. Pingrey and E. J. Dortignac. 80 pp. Illus. New Mexico Agric. Expt. Sta., State University. 1959. Bul. No. 433.

Effects of Herbicides on Some Important Brush Species in Southwestern Oregon. By H. Gratkowski. 33 pp. Illus. Pacific Northwest Forest & Range Expt. Sta., Portland, Ore. 1959. Res. Paper No. 31.

Forage Grass Performance Under Irrigation in Nevada. By J. H. Robertson and Others. 35 pp. Illus. Nevada Agric. Expt. Sta., Reno. 1958. Bul. No. 196.

The Grasshopper-Your Sharecropper. By R. L. Shotwell. 16 pp. Illus. Missouri Agric. Expt. Sta., Columbia. 1958. Bul. No. 714.

Range Management Research; 1958 *Progress Report.* By J. H. Robertson and Others. 26 pp. Nevada Agric. Expt. Sta., Reno. 1958. Cir. No. 22.

The Variation in Protein and Mineral Composition of Hawaii Range Grasses and Its Potential Effect on Cattle Nutrition. By O. R. Younge and K. K. Otagaki. 27 pp. Illus. Hawaii Agric. Expt. Sta., Honolulu. 1958. Bul. 119.

Silviculture

Conifers; South African Methods of Cultivation. By W. E. Hiley. Faber and Faber, London. 1959. 21 s.

Glossary for Forest Tree Improvement Workers. Ed. by E. B. Snyder. 22 pp. Publ. for SAF by Southern Forest Expt. Sta. 1959.

The Native Pinewoods of Scotland. By H. M. Stever and A. Carlisle. Oliver and Boyd, Edinburgh. 1959. 63 s. Postage 2s. 3d.

Soils

Soil-Moisture Constants and Their Variation. By W. M. Broadfoot and H. D. Burke. 27 pp. Southern Forest Expt. Sta., New Orleans, La. 1958. Occasional Paper No. 166.

Soil-Vegetation Surveys in California. By California Forest & Range Expt. Sta. 27 pp. Illus. California Div. of Forestry, Sacramento. 1958.

Wood Techonology and Utilization

The Longitudinal Permeability of Some Hardwoods and Softwoods. By D. N. Smith and Eleanor Lee. 14 pp. Great Britain Dept. of Sci. and Indus. Research, London. 1958. For. Prod. Research Special Rept. No. 13. 1s. (H. M. Sta. Off.)

Timber Identification for the Builder and Architect. By N. Clifford. 141 pp. Illus. Leonard Hill, Ltd., London NW 1. 1959. 37s. 6d. Postage 1s. 2d.

Utilizing Pine Sawmill Residue for Pulp Chips. 11 pp. TVA, Norris, Tenn. 1958. Rept. No. 223-58.

Wood Quality of Mississippi Pine Resources. By H. L. Mitchell and P. R. Wheeler. 11 pp. Charts. U. S. Forest Products Lab., Madison, Wis. 1959. Rept. No. 2143.

Society Affairs

Officers and Council
1958-1959

GEORGE A. GARRATT, *President*
School of Forestry
Yale University
New Haven 11, Conn.

B. E. ALLEN
Union Bag-Camp Paper Corporation
P. O. Box 570
Savannah, Ga.

PHILIP A. BRIEGLEB
Southern Forest Experiment Station
704 Lowich Building
2026 St. Charles Avenue
New Orleans 13, La.

DONALD E. CLARK
U. S. Forest Service
Federal Center, Building 85
Denver 7, Colo.

HENRY J. MALSBERGER, *Vice President*
Southern Pulpwood Conservation Association
900 Peachtree Street, N. E.
Atlanta 9, Ga.

CHARLES A. CONNAUGHTON
U. S. Forest Service
630 Sansome Street
San Francisco 11, Calif.

KENNETH P. DAVIS
School of Natural Resources
University of Michigan
Ann Arbor, Mich.

MAURICE K. GODDARD
Department of Forests and Waters
Harrisburg, Pa.

HENRY CLEPPER, *Executive Secretary*
Mills Building, 17th Street at Pennsylvania Avenue, N. W.
Washington 6, D. C.

WILLIAM D. HAGENSTEIN
Industrial Forestry Association
1410 S. W. Morrison Street
Portland 5, Ore.

J. HERBERT STONE
U. S. Forest Service
729 N. E. Oregon Street
Portland 8, Ore.

HENRY J. VAUX
School of Forestry
University of California
Berkeley 4, Calif.

Strong Sections Make a Stronger SAF

The organization of the Society providing for Sections, Chapters, and subgroups effectively used by the membership can be its forte. The influence of the Society of American Foresters on national philosophy pertaining to the forest and related resources can be no greater than the combined strength of the local divisions representing all sections of the country.

These meetings, on a smaller scale, provide the same opportunities as does a national meeting but in a more personal manner due to smaller attendance. This is an advantage, particularly for the young forester, since it allows for more intimate fellowship. In such atmosphere, he loses any reservation about discussing matters with older and more experienced men because they are associating on the same plane. These contacts have real significance for the many foresters who spend their working days apart from association with other foresters.

Representatives of all types of forestry employment and occupation attend. It is very important that the industrial forester understand the viewpoint of a government forester and vice versa. The same applies to all other occupational groups. An understanding of reasons motivating actions is extremely helpful in resolving misunderstandings. The forester increases his stature by better knowing what is in the mind of another.

The subjects discussed are usually of common interest for all and are about matters of which everybody has some working knowledge. This situation sets the stage for lively exchange of ideas that is also helpful in broadening the capability of the forester.

Matters of national import, even though not of acute concern locally, need to be thoroughly debated. The effect of such matters, including those of a highly controversial nature, need to be determined and decisions made covering courses of action.

The section meetings also provide the opportunity to have subjects importantly related to forestry discussed by experts in those fields. These men of other professional interests not only bring fresh concepts but the contacts also permit the profession to become better known in those areas.

The Society now has 22 Sections, 60 Chapters and numerous sub-groups. The number of these divisions multiplied by the number of times each meets must provide every SAF member an opportunity to attend one or more meetings within a reasonable travel distance. Each member's attendance and active participation in one or more of these meetings will help him personally, strengthen his section, and thereby make of the SAF a more effective spokesman for the profession. By the actions of these groups our profession becomes more of a factor both locally and nationally.

The Council of the SAF at its spring meeting approved a separate business session with section officers to be held in connection with this year's Annual Meeting. Notices have been mailed by the Executive Secretary to these officers. They have been invited to recommend items of particular interest to each for discussion. This provides a splendid opportunity for the sections to bring to Council matters of concern to them and for Council to secure an excellent cross-section of membership opinion relating to the affairs of the Society of American Foresters.

HENRY J. MALSBERGER

Annual Meeting

Society of American Foresters

San Francisco, California, November 15-18, 1959

With a possible total registered attendance of 1200 members, their ladies, and guests, the 59th annual SAF meeting will be held in San Francisco, November 15-18. The theme of the meeting is "Forestry and People."

Headquarters for the meeting will be the Sheraton-Palace Hotel. It will be the scene of the opening general session, the Society Affairs session, nine subject Division meetings, and the Society's annual reception and dinner.

President George A. Garratt will formally open the meeting at 9:30 a.m., on Monday, November 16. Samuel H. Bryan, chairman of the Northern California Section, will serve as chairman of this opening general session.

Schedule of Events

Sunday, November 15

SAF Council meeting; morning and afternoon.

Editorial Board, JOURNAL OF FORESTRY; afternoon.

Association of Consulting Foresters open meeting; evening.

Forest Tree Improvement Committee meeting; evening.

SAF Council and Section delegates joint meeting; evening.

Monday, November 16

General session; morning.

Society Affairs session; afternoon.

Alumni functions (no scheduled SAF meetings); evening.

MONTEREY BAY from Presidio Hill. Fishing fleet comprises for the most part what remains of once flourishing fishing industry.

JOHN CALLAGHAN. Annual Meeting General Chairman.

Tuesday, November 17

Division of Silviculture meeting; morning and afternoon.

Division of Forest Products meeting; morning.

Division of Economics and Policy meeting; afternoon.

Division of Forest Recreation meeting; morning.

Division of Wildlife Management meeting; afternoon.

Ladies' tour to Monterey; all day.

Alumni and social functions (no scheduled SAF meetings); evening.

Wednesday, November 18

Division of Forest Management meeting; morning and afternoon.

Division of Education meeting; morning.

Division of Range Management meeting; morning.

Division of Watershed Management meeting; afternoon.

Reception and dinner; evening.

Thursday, November 19

Field trip to Santa Cruz Mountains; all day.

Preconvention Meetings

November 13. Evening meeting of foresters representing schools of forestry at land-grant colleges and universities, Sheraton-Palace Hotel.

November 13 and 14. A meeting at the Institute of Forest Genetics, Placerville, Calif. of the SAF Tree Improvement Committee and the Western Forest Genetics Association. Program on page 598.

November 14. Closed meeting of the Council of Forestry School Executives, School of Forestry, University of California, Berkeley, Calif.

The Field Trip

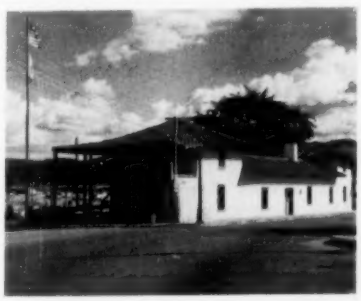
A field trip, for men only, on the general theme "California Forests and People in Miniature," is planned for Thursday, November 19, to the Santa Cruz Mountains.

Chartered busses will leave the Sheraton-Palace at 8 a.m., and proceed via Skyline Boulevard to Big Basin, the Bonnie Doon region, Nielson's Christmas tree plantations, the Santa Cruz Lumber Company, and other points of interest. Lunch will be served in the field.

The busses will return to San Francisco about 5:30 p.m. The cost of the tour will be about $4 or less.

Ladies' Program

Ladies are welcome and invited. The schedule of events has been planned



OLD CUSTOM HOUSE. A unit of the Monterey State Historical Monument. Flagpole is at exact location where Commodore Sloat first officially raised U. S. Flag proclaiming California part of the Union.

with both members and wives in mind. All Division meetings are scheduled during daylight hours. There are no programmed evening meetings.

A special ladies' lounge will be available in the Sheraton-Palace where their registration will start on Sunday afternoon, November 15.

On Monday morning, November 16, they will be guests at a continental breakfast in the hotel.

On Tuesday they will take an all-day tour by special train to the Monterey Peninsula, with a bus trip through Monterey, luncheon in Carmel, and a visit to historic Mission San Carlos Borromeo de Carmelo.

A complete account of the ladies program will be found in the accompanying statement "For the Ladies" by Mrs. DeWitt Nelson, chairman of the Ladies Activities Committee, on page 599.

General Meeting

Monday morning, November 16
Theme: Forestry and People

Samuel H. Bryan, Chairman

1. Welcome by the President, George A. Garratt.
2. "The Impact of Population on Forest Management." Charles A. Connaughton, California Region, U. S. Forest Service, San Francisco, Calif.
3. "Industry Responsibilities and Vulnerability to Population Growth." Clarence W. Richen, Northwest Timber Department, Crown Zellerbach Corporation, Portland, Ore.
4. "Twenty Years of Population and Forestry Advances." Henry J. Vaux, School of Forestry, University of California, Berkeley, Calif.

Society Affairs Session

Monday afternoon, November 16

George A. Garratt, President
Henry J. Malsberger, Vice President
Henry Clepper, Executive Secretary

1. Report of the President.
2. Report of the Executive Secretary.
3. Report of the Editor of Society publications, Arthur B. Meyer.
4. Report of the Editor of *Forest Science*, Stephen S. Spurr.
5. Report of the Committee on International Relations, V. L. Harper.
6. Progress Report on the Study of Education in Forestry and Related Fields of Natural Resources Management, Samuel T. Dana, Director.
7. Report of the Committee for the Advancement of Forestry Education, Frank H. Kaufert, Chairman.

R. KEITH ARNOLD. Program Committee Chairman for the Annual Meeting.

Panel Discussion
State Registration and Licensure of Foresters
Henry J. Malsberger, Moderator

1. "Basic Principles Involved in Registration and Licensing of Foresters." Terrill D. Stevens, Department of Forestry, Michigan State University, East Lansing, Mich.
2. "Needs Involved in Registration and Licensing of Foresters." Wilbur B. DeVall, Department of Forestry, Alabama Polytechnic Institute, Auburn, Ala.
3. "Experiences Involved in Registration and Licensing of Foresters." Archie E. Patterson, School of Forestry, University of Georgia, Athens, Ga.
4. Open discussion.

Division of Silviculture

Tuesday morning, November 17

William H. Cummings, Chairman
Jesse H. Buell, Vice Chairman
Gilbert H. Schubert, Secretary

B. H. PAYNE. Chairman, Committee on Local Arrangements.

1. "Tropical Silviculture." I. T. Haig, U. S. Forest Service, Washington, D. C.
2. "Prescribed Burning in Loblolly Pine Management." Thomas Lotti, Southeastern Forest Experiment Station, Charleston, S. C.
3. "Vegetational Development Following Burning in the Boreal Forest of Minnesota." Clifford E. Ahlgren, Quetico-Superior Wilderness Research Center, Ely, Minn.
4. "Fire Environment and Silvicultural Practice." Clive M. Countryman, Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.
5. Report of the SAF Committee on Natural Areas. John F. Shanklin, Technical Review Staff, U. S. Department of the Interior, Washington, D. C.
6. Report of the SAF Committee on Forest Tree Improvement. R. T. Bingham, Intermountain Forest and Range Experiment Station, Moscow, Idaho.

Tuesday afternoon, November 17

1. "Problems of Pine Seed Supply in the Southeast." P. E. Hoekstra, Southeastern Forest Experiment Station, Lake City, Fla.
2. "Selecting the Proper Seed Source of Ponderosa Pine." Robert Z. Callaham, Intermountain Forest and Range Experiment Station, Spokane, Wash.
3. "Partial Cuttings in Mature Stands of the Western White Pine Type." Charles A. Wellner, Intermountain Forest and Range Experiment Station, and Raymond J. Boyd, U. S. Forest Service, Ogden, Utah.
4. "Photosynthetic Limits of Forest Type Yields." Henry Helmers, Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif., and James Bonner, California Institute of Technology, Pasadena, Calif.
5. "Nutrition of Forest Trees." H. A. Fowells, U. S. Forest Service, Washington, D. C.

Division of Forest Recreation

Tuesday morning, November 17

Frank W. Childs, Chairman
William A. Parr, Vice Chairman
Henry A. Harrison, Secretary

1. Business meeting.
2. Keynote address.
3. Panel Discussion: "Recreation Across the Nation."
4. Questions and review.
5. Progress Report: 1960 Winter Olympics in Squaw Valley.
6. "Problems in Recreational Research Needs."

Division of Forest Products

Tuesday morning, November 17

Bernard M. Granum, Chairman
Rudolph F. Grah, Vice Chairman
Harvey D. Erickson, Secretary

1. "Wood at its Apogee?" Fred E. Dickinson, Director, Univ. of California Forest Products Laboratory, Richmond, Calif.
2. "Utilization from Forest to Finished Product." Richard D. Roseberry, Diamond-Gardner Corporation, Chico, Calif.
3. Panel Discussion: "Log Grading and Utilization." Charles R. Lockard, U. S. Forest Service, Washington, D. C.
4. "Redwood." Nick Poletika, Union Lumber Company, Fort Bragg, Calif.
5. Division Business Session.

Division of Forest Economics and Policy

Tuesday afternoon, November 17

John A. Zivnuska, Chairman
H. R. Josephson, Vice Chairman
James G. Yoho, Secretary

Panel Discussion: "Public Timber Sale Policies and Economic Development in the Western United States."

1. "The Public Timber Resource of the West." John A. Zivnuska, School of Forestry, University of California, Berkeley, Calif.
2. "The Economics of Public Timber Sale Programs." Ira J. Mason U. S. Forest Service, Washington, D. C.
3. "The Impact of Public Timber Sale Programs on the Western Forest Industries." George A. Craig, Western Lumber Manufacturers, Inc., San Francisco, Calif.
4. "Public Timber and Small Business." Charles H. Stoddard, Resources for the Future, Inc., Washington, D.C.
5. "Public Timber and the Diversified Forest Products Operation." A. C. Shaw, Champion Paper and Fibre Company, Hamilton, Ohio.
6. "Public Policy and Economic Development." Walter J. Mead, Department of Social Sciences, University of California, Santa Barbara, Calif.
7. Discussion.
8. Business session and election of officers.

Division of Forest-Wildlife Management

Tuesday afternoon, November 17

Lansing H. Parker, Chairman
James B. Gilligan, Vice Chairman
Howard A. Miller, Secretary

1. "The Long-Range Wildlife Management Program of the U. S. Forest Service." Lloyd Swift, U. S. Forest Service, Washington, D. C.
2. "The Problems in the Use of Systemic Rodenticides." Nelson Kverno, U. S. Fish and Wildlife Service, Olympia, Wash.
3. "Use of Radioactive Scandium 46 to Determine Seed Losses by Animals." William Lawrence and J. H. Rediske, Weyerhaeuser Forestry Research Center, Centralia, Wash.
4. "Deer Range Improvement and Prescribed Burning in Ponderosa Pine." Harold H. Biswell, School of Forestry, University of California, Berkeley, Calif.
5. "The Effects of Current West Coast Logging Practices upon Fisheries Resources." Willis Evans, California Department of Fish and Game, Sacramento, Calif.
6. Business meeting.

Division of Forest Management

Wednesday morning, November 18

Russell K. LeBarron, Chairman
Thomas B. Glazebrook, Vice Chairman
Frank D. Irving, Jr., Secretary
Donald W. Lynch, Program Chairman

Symposium: "Predicting Forest Growth and Calculating Allowable Cut"

Kenneth P. Davis, Moderator

1. "The Problem of Determining Optimum Levels of Growing Stock for Managed Stands." George R. Staebler, Weyerhaeuser Timber Company, Centralia, Wash.
2. "Rotations for Managed Forests." Lawrence S. Gross, U. S. Forest Service, Washington, D. C.
3. "Quantification and Estimation in Future Forest Management." Lewis R. Grosenbaugh, Southern Forest Experiment Station, New Orleans, La.
4. "Calculating Allowable Cuts in Northern Rocky Mountain Forests." John R. Castles, U. S. Forest Service, Missoula, Mont.
5. "Growth and the Allowable Annual Cut." John F. Bell, Oregon State Board of Forestry, Salem, Ore.
6. "Regulated Forest Management —Southern Style." B. E. Allen, Union Bag-Camp Paper Corporation, Savannah, Ga.

Wednesday afternoon, November 18

Donald W. Lynch, Session Chairman

1. Report of Nominating Committee and election of officers for 1960.
2. "Measuring the People Threat to Forest Managers." Craig Chandler, U. S. Forest Service, Glendora, Calif.
3. "Intermountain System of Fire Danger Rating." Charles E. Hardy and A. F. Brackebusch, U. S. Forest Service, Missoula, Mont.
4. "Fighting Forest Fires from the Air." Clinton B. Phillips, California Division of Forestry, in cooperation with Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.
5. "Effects of Growing Space on Wood Specific Gravity in Loblolly Pine." Robert M. Echols, Southern Forest Experiment Station. Gulfport, Miss.
6. "A Test of Continuous Inventory for National Forest Management Based Upon Aerial Photographs, Double Sampling, and Remeasured Plots." C. Allen Bickford, Northeastern Forest Experiment Station, Upper Darby, Pa.
7. "Estimating Timber on Small Tracts by Direct Photogrammetric Methods." Karl E. Moessner, Intermountain Forest and Range Experiment Station, Ogden, Utah.

Division of Education

Wednesday morning, November 18

Peter W. Fletcher, Chairman
William C. Bramble, Vice Chairman
John Carow, Secretary

Theme: "Identifying and Guiding Future Forestry Researchers."

1. From the Viewpoint of Tree Physiology. Robert E. McDermott, School of Forestry, University of Missouri, Columbia, Mo.
2. From the Viewpoint of Forest Genetics. Scott S. Pauley, School of Forestry, University of Minnesota, Saint Paul, Minn.
3. From the Viewpoint of Wood Technology. William T. Nearn, School of Forestry, Pennsylvania State University, University Park, Pa.
4. From the Viewpoint of Forest Economics. John A. Zivnuska, School of Forestry, University of California, Berkeley, Calif.
5. Discussion.
6. Report of the Committee on Safety, Seth Jackson, U. S. Forest Service, Washington, D. C.
7. Business session.

Division of Range Management

Wednesday morning, November 18

Joe A. Wagner, Chairman
R. M. De Nio, Vice Chairman
Lowell K. Halls, Secretary

1. "Compatibility of Forage and Timber Production on Ponderosa Pine Lands." Avon Denham, U. S. Forest Service, Portland, Ore.
2. "Roll of Grass Seeding in the Rehabilitation of Disturbed Areas Following Logging and Fire." James E. Sowder, Lake States Forest Experiment Station, Saint Paul, Minn.
3. "Impacts of Competitive Land Uses on the Production of Adequate

Timber Supplies from Private Lands." Paul E. Shively, Fibreboard Products Inc., San Francisco, Calif.

4. "Improving Cover on California Rangelands to Meet Increasing Demands for Wildlife and Livestock Forage." E. J. Woolfolk, Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.

5. "California Brushlands: Their Characteristics and Utilization." Arthur W. Sampson, School of Forestry, University of California, Berkeley, Calif.

6. "Rehabilitation of California Watersheds Following Wildfire Burns." L. T. Burcham and James B. Davis, California State Division of Forestry, Sacramento, Calif.

Division of Watershed Management

Wednesday afternoon, November 18

Sidney Weitzman, Chairman
Jack S. Rothacher, Vice Chairman
Paul J. Zinke, Secretary
Charles A. Connaughton, Moderator

1. "The National Water Situation—Today and in the Future." E. L. Henricks, Geological Survey, U. S. Department of the Interior, Washington, D. C.

2. "State and Local Activities to Meet Growing Water Needs." Harvey O. Banks, California Department of Water Resources, Sacramento, Calif.

3. "The Role of Public Forest Land in Watershed Management." J. K. Vessey, U. S. Forest Service, Atlanta, Ga.

4. "The Role of Private Forest Land in Watershed Management." Carl J. Johnson, Interstate Commission on the Potomac River Basin, Washington, D. C.

5. "Forest Watershed Research—Its Accomplishments and Opportunities." Marvin Hoover, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.

6. Discussion period.

7. Business session.

The Society Dinner

Wednesday evening, November 18

William D. Hagenstein, Toastmaster

1. Presentation of the Society of American Foresters award for achievement in biological research, by President George A. Garratt.

2. "Our Western Frontier." James H. Shoemaker, Vice President, Bank of Hawaii.

3. Entertainment with a Spanish-American theme.

Hotel Reservations

Those planning to attend the meeting are advised to arrive in San Francisco on Sunday, November 15, or not later than 9 a.m., Monday, November 16. The first general session will start at 9:30 a.m., Monday, in the Sheraton-Palace Hotel.

The Sheraton-Palace, on Market Street at New Montgomery Street, will be the headquarters for the meeting. The zone number is San Francisco 19.

This hotel has 700 rooms, but it will not be able to accommodate all those in attendance. Hence, other cooperating hotels are making space available.

All requests for room reservations should be sent to the Society of American Foresters Housing Committee, Room 300, 61 Grove Street, San Francisco 2, Calif. All reservations will be confirmed if the requests are received not later than October 31.

For each room reserved, there should be an accompanying deposit of $10. Checks should be made payable to SAF Housing Bureau.

Reservations will be accepted and confirmed in the order of their receipt. Assignment of rooms will be made at, or as near, the desired rate as possible. Early reservation requests are desirable.

The reservation coupon on page 598 may be used. Readers who do not want to cut the coupon from their JOURNALS may request reservations by letter, provided all the information listed on the coupon is given.

Cancellations must be received 15 days prior to the meeting for refunds of deposits to be made by the hotel. If sufficient time is not allowed for the hotel to reassign space, the deposit is forfeited.

Hotels and Rates

All rates quoted are with bath; these are daily rates.

Sheraton-Palace Hotel, Market Street at New Montgomery Street; 700 rooms; adjacent garage. Single occupancy: $11 to $21. Double-bed rooms: $15 to $25. Twin-bed rooms: $15 to $25. Parlor suites: $28 up.

Bellevue Hotel, 505 Geary Street, at Taylor; 250 rooms; garage attached. Four blocks from Sheraton-Palace. Single occupancy: $7.50 to $10. Double-bed rooms: $9.50 to $12.50. Twin-bed rooms: $11 to $15.

Beverly-Plaza Hotel, 342 Grant Avenue, at Bush Street; 200 rooms. Six blocks from Sheraton-Palace. Single occupancy: $7 to $9. Double-bed rooms: $9 to $11. Twin-bed rooms: $10 to $12.

Californian Hotel, 405 Taylor Street at O'Farrell Street; 300 rooms; garage next door. Six blocks from Sheraton-Palace. Single occupancy: $9 to $11. Double-bed rooms: $11 to $13. Twin-bed rooms: $11 to $14.

Chancellor Hotel, 433 Powell Street; 150 rooms; garage service. Six blocks from Sheraton-Palace. Single occupancy: $7. Double-bed rooms: $9. Twin-bed rooms: $10.

Clift Hotel, Geary at Taylor Street; 400 rooms. Six blocks from Sheraton-Palace. Single occupancy: $13 to $21. Double-bed rooms: $15 to $17. Twin-bed rooms: $16 to $23.

Drake Wiltshire Hotel, 340 Stockton Street; 250 rooms; garage available. Four blocks from Sheraton-Palace. Single occupancy: $10 to $11. Double-bed rooms: $12 to $14. Twin-bed rooms: $15 to $16.

Manx Hotel, 225 Powell Street; 300 rooms; garage service. Four blocks from Sheraton-Palace. Single occupancy: $6 to $9. Double-bed rooms: $9 to $11. Twin-bed rooms: $10 to $12. Parlor suites: $15 and $20.

St. Francis Hotel, Powell and Geary Streets (Union Square); 1,000 rooms. Four blocks from Sheraton-Palace. Parking in Union Square garage. Single occupancy: $11 to $22. Double-bed rooms: $13 to $20. Twin-bed rooms: $16 to $25. Parlor suites: $30 to $50.

Sir Francis Drake Hotel, 450 Powell Street, at Sutter; 600 rooms; basement garage. Six blocks from Sheraton-Palace. Single occupancy: $10.50 to $15.50. Double-bed rooms: $12.50 to $17.50. Twin-bed rooms: $15.50 to $20.50. Suites: $34 up.

Stewart Hotel, 351 Geary Street, at Union Square; 400 rooms, garage service. Four blocks from Sheraton-Palace. Single occupancy: $7 to $10. Double-bed rooms: $8 to $10. Twin-bed rooms: $10 to $18.

Sutter Hotel, 191 Sutter Street; 200 rooms. Two blocks from Sheraton-Palace. Single occupancy: $5 to $7. Double-bed rooms: $7 to $9. Twin-bed rooms: $8 to $10.

Subscription Rate Increased

JOURNAL OF FORESTRY

Effective January 1, 1960 annual subscription rate to the JOURNAL OF FORESTRY will be increased to $9. Foreign postage ($1) and Canadian postage (50¢) remain the same.

Renewals and new subscriptions to the JOURNAL OF FORESTRY, beginning with the January 1960 issue will be payable at the increased rate.

Whitcomb Motor Hotel, 1231 Market Street, at 8th; 500 rooms; ample parking. Seven blocks from Sheraton-Palace. Single occupancy: $7 to $12. Double-bed rooms: $9 to $16. Twin-bed rooms: $10 to $16.

YMCA, 351 Turk Street. Seven blocks from Sheraton-Palace. Single occupancy: $4.25 to $5.50. Double-bed rooms: $5.25 to $6. Twin-bed rooms: $7.

Motels and Rates

San Francisco has 30 motels. A list of them with their addresses and daily rates may be obtained on application to the Convention and Visitors Bureau, 300 Civic Auditorium, 61 Grove Street, San Francisco 2, Calif.

In requesting a motel reservation, payment equal to the daily rate but in no case less than $8 should accompany the reservation. Checks should be made payable to SAF Housing Committee.

The following motels will make rooms available if reservations are made at least 15 days in advance:

Broadway Manor Motel, 2201 Van Ness Street at Broadway. About 30 blocks from Sheraton-Palace. Single occupancy: $8 to $12. Double-bed rooms: $10 to $12. Twin-bed rooms: $12 to $14.

Lombard Plaza Motel, 2026 Lombard Street; U. S. Route 101. Two miles from Sheraton-Palace. Single occupancy: $6 to $8. Double-bed rooms: $8 to $10. Twin-bed rooms: $9 to $12.

Market Street Travelodge, 1707 Market Street. Fourteen blocks from Sheraton-Palace. Single occupancy: $8 to $10. Double-rooms: $9 to $12. Twin-bed rooms: $11 to $14.

Committees for the Meeting

General Chairman, John Callaghan, 1307 Teneighth Way, Sacramento, 18, Calif.

Program Committee, Keith Arnold, chairman, Pacific Southwest Forest and Range Experiment Station, P. O. Box 245, Berkeley 1, Calif.; John R. Dilworth, Edwin F. Heacox, James K. Mace, Knox Marshall.

Committee on Local Arrangements, B. H. Payne, chairman, T. H. Harris, vice chairman, U. S. Forest Service, 630 Sansome Street, San Francisco 11, Calif.

Mrs. DeWitt Nelson, Ladies Activities.

Clyde Walker, Information and Publicity.

George A. Craig, Exhibits.

Robert Colwell, Meeting Rooms.

Rudolph F. Grah, Field Trip.

MAP OF DOWNTOWN San Francisco showing the relative location of hotels that are cooperating with the SAF Housing Committee for the 1959 annual meeting.

Hotels

A. Sheraton-Palace Hotel.
B. Bellevue Hotel.
C. Beverly Plaza Hotel.
D. Californian Hotel.
E. Chancellor Hotel.
F. Clift Hotel.
G. Drake Wiltshire Hotel.
H. Manx Hotel.
J. St. Francis Hotel.
K. Sir Francis Drake Hotel.
L. Stewart Hotel.
M. Sutter Hotel.
N. Whitcomb Hotel.
P. YMCA

Motels

R. Broadway Manor Motel.
S. Lombard Plaza Motel.
T. Market Street Travelodge.

SOCIETY OF AMERICAN FORESTERS

1959 Annual Meeting

San Francisco, California. November 15, 16, 17, and 18

Housing Committee, Society of American Foresters,
Room 300, 61 Grove Street,
San Francisco 2, California.

First choice hotel _____

Second choice hotel _____

Third choice hotel _____

Please make a reservation for the following room accommodations for arrival on November———, a.m. p.m. Departure———, a.m. p.m.

I understand that accommodations will be provided at the daily rate specified, if available; otherwise the nearest rate available will apply.

——— Single room with bath. Rate $———.

——— Double-bed room with bath. Rate $———.

——— Twin-bed room with bath. Rate $———.

——— Suite (parlor, twin-bed room, and bath). Rate $———.

——— Other. (Specify accommodations desired.) Rate $———.

The above accommodations are requested for the following persons in addition to myself. (Please print or typewrite names and addresses legibly.)

_____

_____

_____

My name: _____

Street address: _____

City, zone, state: _____

Enclosed is a deposit in the amount of $———.

Important Notice: Members submitting requests for hotel reservations are asked to indicate below if their wives will wish to go on the all-day tour for ladies to Monterey on Tuesday, November 17.

☐ My wife wishes to go on the ladies' tour.

Grant A. Morse, Housing and Registration.

William R. Schofield, Entertainment.

Meeting of SAF Tree Improvement Committee and Western Forest Genetics Association

at Institute of Forest Genetics
Placerville, Calif.
Friday, November 13
F. I. Righter, Tour Leader
Conducted tour of Institute of Forest Genetics and field trip to grounds, arboretum, nursery, and outplantings.
Saturday, November 14

R. T. Bingham, Program Chairman.

1. "Geographic Variation in Ponderosa Pine Seedling Physiology." Robert Z. Callaham, Intermountain Forest and Range Experiment Station, Spokane, Wash.

2. "Variations in Crown-Form Attributes in Populations of Douglas-fir." Robert K. Campbell, College of Forestry, University of Washington, Seattle, Wash.

3. "Provenance Study of Douglas-fir in the Pacific Northwest Region (Nursery Performance)." Kim K. Ching and Dale N. Bever, Oregon Forest Lands Research Center, Corvallis, Ore.

4. "Effect of Elevation and Climatic Factors on Production and Dispersal of Coniferous Tree Pollen." Lorne F. Ebell, Forestry Branch, Canadian Department of Northern Affairs and Natural Resources, Victoria, B. C., and Ralph L. Schmidt, British Columbia Forest Service, Victoria, B. C.

5. "Some Thoughts on Seed Orchards and Their Establishment." Bent Gerdes, Firseed, Inc., Eugene, Ore.

6. "A Douglas-fir Seed Orchard: First Year Results." Thomas E. Greathouse and Virgil Allen, U. S. Forest Service, Portland, Ore.

7. "Timing of Pollen Application in Relation to Viable Seed Yield in *Pinus strobus*." Howard B. Kriebel, Ohio Agricultural Experiment Station, Wooster, Ohio.

8. "Kinds of Racial Variation and Their Significance." Thomas O. Perry, California Institute of Technology, Pasadena, Calif.

9. "Heritability of Juvenile Growth Rate in Western White Pine." A. E. Squillace and R. T. Bingham, Southeastern Forest Experiment Station, Lake City, Fla.

10. "Natural Variation of *Populus tremuloides* and *P. dentata* in Northern Lower Michigan." Burton V. Barnes, Northern Idaho Forest Genetics Center, Moscow, Idaho.

For the Ladies

San Francisco Bay will sparkle with a special brilliance on Monday morning, November 16, 1959 and the Sheraton-Palace Hotel will open wide its doors to welcome the ladies to the fifty-ninth meeting of the Society of American Foresters.

Since 1875 the Palace has mirrored the colorful, romantic, lusty history of the city by the Golden Gate and today it offers the finest example of generous, gracious western hospitality. Once upon a time the balconies which surrounded the inner court blossomed with lovely ladies who watched for the elegant swains who would alight from carriages which swung through the portals, made dashing turns and abruptly halted. This was before the fire of 1906 but the rebuilt Garden Court will be the scene of the Society's Annual Banquet. The parlor, which will be available for the use of the ladies, is called the Comstock Room, a name which recalls the garden era when the bonanza kings and their queens enjoyed the bountiful hospitality of this hotel.

Mission San Carlos Borromeo (Carmel Mission) founded in 1770. This mission contains the remains of Father Junipero Serra, the head of the Franciscan Order in California, popularly known as the Father of the Missions in California. Father Serra died in 1784.

How can San Francisco be described? It is a cosmopolitan city, enchanting, gay, beautiful and with a spirit that enraptures all who visit it. There are magnificent shops, flower stands, exotic Chinatown and the Japanese Tea Garden, Golden Gate Park and restaurants to suit every taste. It is to this lovely city that the wives of California foresters bid you welcome and we urge you to plan for a few extra days in which to enjoy its many pleasures.

At 9 a.m., Monday morning, November 16, at the Sheraton-Palace Hotel the ladies will be guests at a continental breakfast. The program of entertainment will be outlined and information about shops and places of interest will be given. It is important that all the wives and guests in attendance at the Society meeting be present at this affair. Registration begins at 12:30 p.m. on Sunday, November 15, in the Ladies Parlor and coffee will be served from 3 to 5 p.m. Registration will be completed on Monday at the breakfast in order that the necessary reservations for tours can be made.

Fascinating as is San Francisco, in planning for the entertainment for the ladies it was decided that a trip which would give a broader look at California, and an understanding of the history and topography of the state would be most enjoyable. It is also important that time be available for visiting and renewing friendships. On Tuesday, November 17, we will travel by special train to the fabulous Monterey Peninsula. It will be an all day trip but we are sure it will be a day long remembered.

The City of Monterey is the old Spanish capital of California and the area of the Monterey Peninsula is called the loveliest meeting place of land and sea in America. It was up this coast that Juan Rodriquez Cabrillo sailed in 1542. Beside the gates of the Monterey Presidio stands a large white cross, dedicated to Sebastian Vizcaino. Here stood a splendid oak under which on December 16, 1602, Fray Antonio de la Ascension celebrated mass, blessing the land in the name of the King of Spain, for whom it was claimed. Vizcaino named it in honor of his patron, the Count of Monterey. A permanent settlement was established on June 3, 1770 by Gaspar de Portola and Junipero Serra, the Father of the California Missions.

Almost two hundred years later our bus tour will carry us from the Monterey station past the historic Presidio and through the city. We will stop at the adobe house of Thomas O. Larkin, the first American consul to the Mexican government. This home, built in 1835, is a gem of Monterey colonial architecture and contains one of the one hundred most beautiful rooms in America. The famed Seventeen-Mile Drive, Del Monte Lodge, and Pebble Beach Golf Course will be viewed before lunch. The La Playa Hotel in Carmel will be the setting for luncheon and time will be allowed for a short tour of the shops of Carmel.

A stop at the lovely Mission San Carlos de Borromeo and return to San Francisco in time for dinner will conclude the trip. The all-expense cost will be $11.50.

Short San Francisco tours of unusual interest will be arranged for Wednesday and Thursday. The complete program for the ladies will be published in the September issue of the Journal. The committee believes that this will enable you to plan your time and to reap the fullest enjoyment from that chapter entitled "San Francisco, 1959."

Mrs. DeWitt (Sadiebelle) Nelson

Breakfast — Sheraton-Palace Hotel — November 16, 1959

Seventh Call for Council Nominations

All members are hereby notified that the regular biennial election will be held December 5, 1959. A president, vice president, and nine other members of the Council will be elected for the two-year term 1960-1961.

The present Council is listed on page 592. Any or all of these incumbents may be renominated, provided they accept the nomination in writing.

Membership on the Council is restricted by the Constitution to Members (formerly Senior Members) and Fellows. Any Member or Fellow is eligible to hold office who is in good standing and who accepts the nomination in writing and declares his willingness to serve if elected.

Each voter will have an opportunity to ballot on all candidates for office. Council members are elected in accordance with the system of proportional representation. The procedure of proportional representation will be explained in a later issue of the JOURNAL. It is the system by which the Society has been electing Council members for more than two decades.

Table 1, page 136 February issue, shows distribution of Council members by states 1944-1959.

Candidates for the office of president are voted on separately; the candidate who receives the highest vote is declared elected president, and the candidate who receives the next highest vote is declared elected vice president. Thus all candidates for president are considered as nominated also for vice president.

How Nominations Are Made

The Constitution (Article VIII, Section 2) states the conditions under which nominations are made by petition.

1. Each petition shall name but one candidate.

2. All candidates must be eligible to hold elective office.

3. A petition shall bear the signatures of at least ten voting members who at the time of signing the petition are eligible to vote in the coming election. (Eligible voting members are Junior Members, Members, and Fellows in good standing.)

4. A voting member may not sign more than one nominating petition for president or more than one nominating petition for a member of the Council. That is, he may sign two, but no more.

5. Petitions must be in the Society office by September 19, 1959.

The Society has no special form for submitting nominating petitions. They may be written as follows:

We, the undersigned voting members of the Society of American Foresters, hereby nominate John Doe, a Member (or Fellow) for the office of president (or member of the Council) for the two-year term 1960-1961.

No nomination will be considered valid unless supported by the nominee's acceptance in writing.

The form of acceptance of a nomination may read as follows:

"I accept the nomination to the office of President (or to membership on the Council) of the Society of American Foresters for the two-year term 1960-1961, and agree to serve if elected."

All nominating petitions should be sent promptly to the Society office, 425 Mills Building, Washington 6, D. C. The executive secretary will gladly provide information about nominating or election procedure.

According to the Constitution (Article VIII, Section 1) a Nominating Committee has been appointed by President Garratt. The Committee is composed of the following members:

Chairman, Harry Wm. Dengler, Extension Service, University of Maryland, College Park, Md.

Earl J. Adams, 4705 Tenth Avenue South, Minneapolis 7, Minn. (State Division of Forestry.)

Robert R. Milodragovich, U. S. Forest Service, Cody, Wyo.

Harry M. Roller, Jr., Woodlands Department, International Paper Company, Mobile 9, Ala.

George Stenzel, College of Forestry, University of Washington, Seattle 5, Wash.

This committee is charged with the following duties:

1. To set the date of the election. (December 5, 1959, is the date.)

2. To provide for at least two candidates for the office of president, and at least nine candidates for membership on the Council.

3. To receive separate nominating petitions for the office of president and for each member of the Council, and to supplement such petitions when necessary with other nominations in order to comply with item 2 above.

The Nominating Committee will make no nominations of its own unless the voting membership fails to make the required minimum number of nominations by petition. Voting members should accordingly get busy and make their own nominations.

Nominations Received

On the date of going to press the following nominations had been received:

For President

C. A. Connaughton, San Francisco, Calif. (Council member 1958-1959.)

Henry J. Malsberger, Atlanta, Ga. (Vice president 1958-1959.)

E. T. F. Wohlenberg, Ukiah, Calif.

For the Council

B. E. Allen, Savannah, Ga. (Council member 1956-1957 and 1958-1959.)

William C. Bramble, Lafayette, Ind.

S. T. Carlson, Santa Fe, N. Mex.

Donald E. Clark, Denver, Colo (Council member 1958-1959.)

Robert W. Cowlin, Portland, Ore.

Kenneth P. Davis, Ann Arbor, Mich. (Council member 1958-1959.)

George A. Garratt, New Haven, Conn. (President 1958-1959.)

W. D. Hagenstein, Portland, Ore. (Council member 1958-1959.)

Albert G. Hall, Washington, D. C.

Svend O. Heiberg, Syracuse, N. Y.

Robert N. Hoskins, Richmond, Va.

Horace R. Josephson, Washington, D. C.

Clemens M. Kaufman, Gainesville, Fla.

Arthur W. Nelson, Hamilton, Ohio.

Harrod B. Newland, Frankfort, Ky.

Wm. Morris Palmer, Jr., Natchitoches, La.

Richard J. Preston, Raleigh, N. C.
Waller H. Reed, Chester, Calif.
Charles L. Tebbe, Missoula, Mont.
James K. Vessey, Atlanta, Ga.
John Zivnuska, Berkeley, Calif.

HARRY WM. DENGLER, *Chairman*
Nominating Committee

Seventh Call for Fellow Nominations

All Members (formerly Senior Members) and Fellows of the Society are hereby advised that nominations for the grade of Fellow are now open. The election of Fellows will be held at the time of the Society's regular biennial election, December 5, 1959.

As defined by the Constitution (Article III, Section 7), "Fellows shall be foresters recognized generally throughout the profession as persons who have rendered outstanding service to forestry and to the Society. They shall be elected from the Members."

Nominations by Petition

The procedure for placing Members in nomination for the grade of Fellow is by petition. The Society has no printed form for this purpose; the petition may be typewritten thus:

We, the undersigned Members and Fellows of the Society of American Foresters, hereby nominate John Doe for election to the grade of Fellow in 1959.

Remember these simple rules:

1. A petition may not name more than one candidate.

2. It must be signed by not less than 25 Members or Fellows in good standing.

3. It should be accompanied by a factual, not eulogistic, biographical sketch of at least 300 words giving an account of the nominee's professional career and accomplishments.

4. It must be received in the executive office of the Society in Washington, D. C., not later than September 19, 1959.

The executive employees of the Society cannot be responsible for obtaining signatures on partially completed petitions or on petitions incomplete by reason of unacceptable signatures (that is, signatures of other than Members and Fellows in good standing).

Election Procedure

Fellows are not elected by the membership at large, but by a board of electors which consists of all present Fellows, the Council, the chairmen of the 21 Sections, and the chairmen of the 9 subject Divisions.

The system is described in Article IV, Section 4 of the Constitution. To win election a nominee must receive an affirmative vote of not less than one-half the total number of votes cast, as provided in Bylaw 11.

For the 1959 election there will be 128 electors, of whom 88 are Fellows. An elector has one vote only. A Fellow who is also a Council member has but one vote.

Significance of the Grade

The highest membership distinction that can be conferred by the Society, this grade is awarded in recognition of outstanding service to forestry and to the Society. Fellows do not pay increased dues; their dues are the same as those of Members.

Since the Society was founded in 1900, there have been 125 Fellows elected. At the present time the number of living Fellows is 88.

Since the last election in December 1957, three Fellows have died: S. R. Gevorkiantz of Minnesota, J. S. Holmes of North Carolina, and F. W. Morrell of Virginia.

A list of the current fellows was published in the May issue of the JOURNAL.

Fellow Nominations

On the date of going to press the following Members had been nominated for the grade of Fellow:

N. T. Barron, Franklin, Va.

Charles A. Connaughton, San Francisco, Calif.

Clifford H. Foster, Warrensburg, N. Y.

Bishop F. Grant, Athens, Ga.

L. R. Grosenbaugh, New Orleans, La.

V. L. Harper, Washington, D. C.

George B. Hartman, Ames, Iowa.

Richard Kilbourne, Norris, Tenn.

Harold S. Newins, Gainesville, Fla.

F. X. Schumacher, Durham, N. C.

Lewis M. Turner, Logan, Utah.

Harold G. Wilm, Albany, N. Y.

Ernest Wohletz, Moscow, Idaho.

Foundation Makes Grant for Study of Natural Areas

For more than twelve years a Committee on Natural Areas of the Division of Silviculture has been carrying out an expressed objective of the Society of American Foresters by endeavoring to locate and have set aside under adequate assurances for permanent preservation representative units of virgin or old growth forest types for the purpose of future research in the fields of silviculture, forest management, and related ecological subjects.

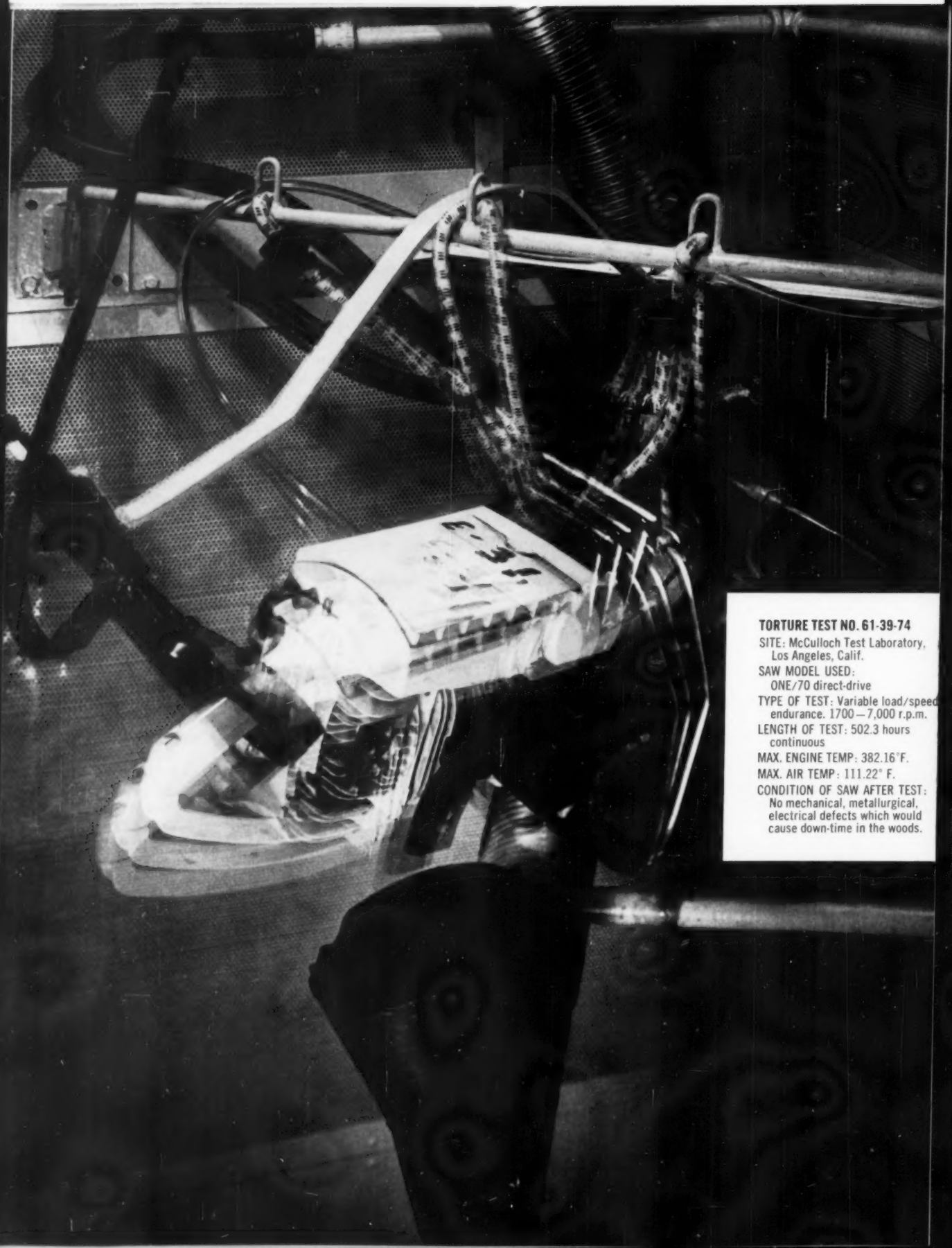
After considerable reflection the Committee on Natural Areas came to the conclusion that it had about exhausted the possibility of locating through the media of correspondence and printed articles natural areas which might include the missing forest types indigenous to the Southeast. Hence, it believed that what was needed was a comprehensive field investigation by a qualified research forester.

Accordingly, the Committee recommended to the SAF Council and the Society submitted a specific request to Resources for the Future for a grant to permit such a field investigation. President George A. Garratt announced on June 18 that Resources for the Future had concurred in the request and had authorized a grant of $7,000 to be available for one year.

John F. Shanklin, Chairman of the Committee on Natural Areas, will be in general charge of the project. His address is Technical Review Staff, U. S. Department of the Interior, Washington 25, D. C. Members of this Committee besides Mr. Shanklin are:

Richard E. Griffith.
Neil Hosley.
Ivan H. Sims.

Selection of the forester to undertake the field work had not been made at the time of going to press with this issue of the JOURNAL.



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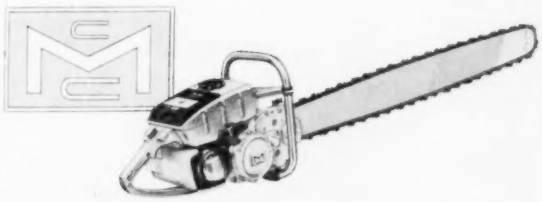
See your McCulloch Chain Saw Dealer for a free demonstration.



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McCulloch of Canada Ltd., Toronto, Canada • McCulloch International Inc., Los Angeles 45, Calif.

5-9001

Stand on Trained Planners Reasserted

Hon. Ezra Taft Benson
Secretary of Agriculture
U. S. Department of Agriculture
Washington 25, D. C.

Dear Sir:

At a recent meeting of the Council of the Society of American Foresters, the members unanimously reaffirmed an action taken in 1956, expressing the strong position of the Society against those employees of the Soil Conservation Service who are not professional foresters undertaking the preparation of forest management plans and carrying on silvicultural practices on the private woodlands of cooperators.

The action taken in 1956 resulted from instances when SCS farm planners, without professional education in forestry, were actually undertaking the application of silvicultural treatments on farm woodlands.

Mr. DeWitt Nelson, then president of the Society of American Foresters, called this matter to the attention of Mr. D. A. Williams, administrator of the Soil Conservation Service. In a letter dated March 28, 1956 Mr. Williams wrote Mr. Nelson as follows:

"There is no disagreement between the Soil Conservation Service and the Society of American Foresters on the point that nonprofessional personnel should not develop recommendations as to silvicultural practices. . . . We require our farm planners to recognize when a farmer or rancher should be encouraged to seek professional assistance which we do not have available or which it is not appropriate for us to provide . . ."

Pointing out that "it is very difficult to avoid occasional infractions of the policies of a large organization," Mr. Williams assured Mr. Nelson that he would inquire into the details of specific cases that were reported to him as being violations of SCS policy.

The purpose of this present letter is not to criticize Mr. Williams or the SCS for we believe that it continues to be SCS policy to utilize the services of professionally trained foresters only only in the preparation of forest management plans and the application of silvicultural practices.

We have reason to believe, however, that the policy announced by Mr. Williams is under pressure for change. The Council of the Society of American Foresters hopes that the Soil Conservation Service will not condone the preparation of forest management plans by farm planners lacking professional training in forestry.

Very truly yours,
George A. Garratt
President

May 22, 1959

Inland Empire Section Officers Elected

The following officers for the Inland Empire Section, Society of American Foresters, were elected for the year ending June 30, 1960:

Chairman—Vernon H. Burlison, extension forester, University of Idaho, Moscow.

Vice Chairman—Garry B. Ringold, Potlatch Forests, Inc., Potlatch, Idaho.

Secretary-Treasurer—Thomas L. Finch, Moscow, Idaho.

Councilor—Alva H. Blackerby, U. S. Forest Service, Grangeville, Idaho.

Additional members of the Section's Executive Council are: G. F. Weyermann, Arlie D. Decker, and Earl Ritsheimer.

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Coming Events

Intermountain Section

The Intermountain Section will hold its summer meeting September 5-6 with meeting headquarters at the USFS Ranger Station, Panguitch, Utah. Field trips will start 1 PM on the 5th and end at noon the next day, with remainder of time for sight-seeing. Families are especially invited.

New York Section

The summer meeting of the New York Section will be held September 17-18 at Arnot Forest, near Ithaca. Topic: Management experiments in the area with emphasis on Chemo-forestry as follow-up of winter meeting theme.

Conservation Education Association

The annual conference of the Conservation Education Association will be held at Sul Ross College, Alpine, Texas, August 17-20. Theme: "Developing a Program for In-Service Training in Conservation Education for the Public Schools."

National Shade Tree Conference

The 35th annual convention of the National Shade Tree Conference will be held in the Hotel Statler, Detroit, Mich., August 17-21.

Northeastern Forest Tree Improvement Conference

The seventh annual Northeastern Forest Tree Improvement Conference will be held at the University of Vermont, Burlington, August 18-19.

Soil Conservation Society

The 14th annual meeting of the Soil Conservation Society of America will be held August 26-28 in Rapid City, S. Dak.

New England Section

The New England Section will hold its summer meeting August 27-28 at the University of Connecticut, Storrs, Conn.

Lake States Forest Tree Improvement Conference

The Fourth Lake States Forest Tree Improvement Conference has been scheduled for October 6 and 7, at the University of Michigan, Ann Arbor.

Central States Section

A joint meeting of the Central States Forest Tree Improvement Committee and Central States Section of the SAF will be held at the Ohio Agricultural Experiment Station, Wooster, on October 8 and 9.

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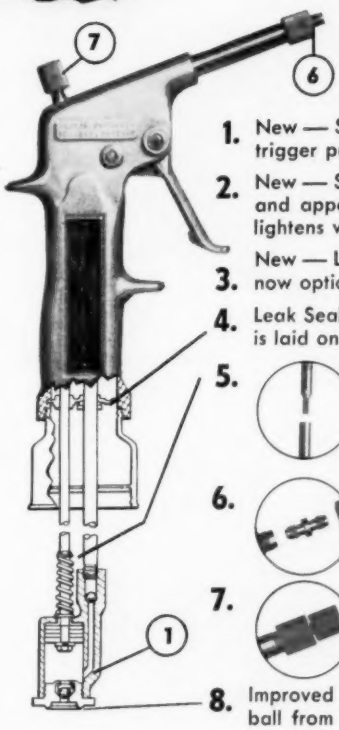

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Northern California Section Holds Spring Meeting

With an attendance of more than one hundred, the Northern California Section held its spring meeting in the Santa Cruz area, June 5 and 6.

The dinner was served in the Riverside Hotel, Santa Cruz, on June 5. Carl Newport was toastmaster.

One June 6 the members made a tour of places of forestry interest in the Santa Cruz mountains, with luncheon served at the Nielson Christmas plantation and tree farm.

New officers who will serve for the coming year are:

Chairman—Sam H. Bryan, West Point, Calif.

Vice Chairman—Wesley W. Spinney, Eureka, Calif.

Treasurer—George R. Grogan, Redding, Calif.

Secretary—Ronald S. Adams, Davis, Calif.

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South Carolina Foresters Meet

The annual South Carolina summer meeting of the Appalachian Section, SAF was held in Georgetown on May 29 and 30. Approximately 125 foresters were present.

The group toured the International Paper Company mill and woodlands and visited the West Virginia Pulp and Paper Company Westvaseo Experimental Forest.

Walter T. Ahearn, assistant state forester, S. C. State Commission of Forestry, Columbia, S. C., is chairman of the Appalachian Section. Co-Chairmen of the summer meeting were Charles Millwood of the International Paper Company and L. T. Easley of the West Virginia Pulp and Paper Company.

Lower Michigan Chapter Issues Cutting Practices Recommendations

Cutting practices that will improve the forest stands of Lower Michigan and keep them reasonably productive are outlined in a 37-page booklet prepared by the Lower Michigan Chapter of the Wisconsin-Michigan Section, SAF. While the emphasis is on good cutting practices, minimum practices are also outlined as a red flag of warning beyond which cutting should not go. Copies of the pamphlet may be obtained from Chapter Secretary-Treasurer Richard Lohrey, 1116 Burlingame St., Cadillac, Michigan for 10 cents in coin to cover cost of mailing.

Cyril B. Webster (1898-1959)

C. B. Webster died in an Alexandria, Va., hospital on June 8 following a series of heart attacks suffered during preceding months.

Born April 30, 1898 at Van Wert, Ohio, Mr. Webster earned his B. S. degree in forestry at the University of Michigan, graduating in 1920.

At the time of his death he was chief forester for the Corps of Engineers, U. S. Army, having held that position since its creation seven years ago. He supervised management, protection, and sales on all Army-owned forest lands.

Mr. Webster began his professional career with the U. S. Forest Service and then in 1925 became extension forester at Texas A and M College. From 1929 to 1935 he was chief of the division of forest management of the Texas Forest Service, in the latter year joining the Soil Conservation Service. He remained with the SCS until the time he took over his post with the Corps of Engineers.

A member of the Society of American Foresters since 1923, Mr. Webster was a past chairman of the Washington Section.

Richard M. May (1905-1959)

Richard M. May, assistant state director of the Soil Conservation Service for Connecticut and Rhode Island, with headquarters at Storrs, Conn., died June 21.

Born July 31, 1905 in Shenandoah, Pa., Mr. May was a 1927 graduate of the old Pennsylvania State Forest School at Mont Alto.

In 1928 he became a forest inspec-

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tor for the Pennsylvania Department of Forests and Waters, and during the next seven years served in various field assignments for the Department.

Joining the Soil Conservation Service of the U. S. Department of Agriculture in Maryland in 1935, he was with SCS for the remainder of his career, serving also in Pennsylvania and New England. In addition to his work in forestry, Mr. May specialized in wildlife management and was an experienced ornithologist.

He became a Junior Member of the Society of American Foresters in 1929 and was advanced to the Member grade in 1937. He was an occasional contributor to the book review section of the JOURNAL OF FORESTRY.

Harry Pryor Rigdon (1892-1959)

Harry P. Rigdon, extension farm forester of Oklahoma A and M College, Stillwater, died May 15 of a heart attack.

Born May 13, 1892, in Jefferson County, Nebraska, Mr. Rigdon received his B.S. degree, with a major in forestry, from the University of Nebraska in 1916. After a year of graduate work he was employed by the Bureau of Plant Industry and then as a county extension agent in Nebraska. During the period 1920-1935 he owned and managed the Seward Nursery, Seward, Neb. From October, 1935 to September, 1937 he held the position of chief nurseryman in Kansas for the U. S. Forest Service Shelterbelt Project. After serving for two years as assistant state forester in Oklahoma he became extension forester for Oklahoma A and M.

Mr. Rigdon became a member of the Society of American Foresters in 1938.

Membership Applications and Advancements

Proposals for admission, advancement, and reinstatement received in the Society office during the month of June are listed below.

Action on the eligibility of those proposed for membership as listed below will be taken by the Council as of September 1959.

Communications from the voting members regarding the membership eligibility of these persons should be received in the Society office prior to that date.

Allegheny Section

Student Grade

PENNSYLVANIA STATE UNIVERSITY
Pitzer, H. C.

WEST VIRGINIA UNIVERSITY
Gnegy, D. C.

Junior Grade

Santamour, F. S., Geneticist, Northeastern Forest Expt. Sta., Philadelphia, Pa. (Reinstatement).

Students Eligible for Automatic Advancement

PENNSYLVANIA STATE UNIVERSITY

Boyer, R. G.	LaBar, R. J.
Clarke, J. F.	Marker, J. F.
Engle, C. H.	Meier, G. A.
Funk, C. V.	Peace, R. T.
Grube, W. R.	Snyder, G. W.
Kurtz, S. M.	Stroh, R. C.

Whitecavage, J. B.

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2. MOTRAC radio eliminates the most common maintenance problems: vibrators in the power supply and tubes in the receiver. All are replaced by stabilized long-life transistors.

3. Up to 40°F cooler operation means less aging and strain on components. Reason: no more receiver tube filaments; a more efficient power supply; a battery saver switch to cut off transmitter filaments; and two separate heat sinks—one for power supply, another for transmitter output tubes.

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5. Traditional Motorola engineering and production excellence are evident throughout MOTRAC radio. Transistors undergo three separate checks, including a week of stabilization at 185°F. Only industrial-type tubes, especially suitable for the rigors of mobile operation, are used in the transmitter.

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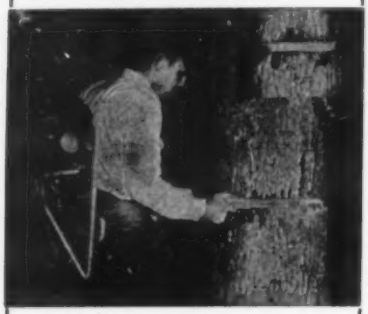

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WEST VIRGINIA UNIVERSITY

Walker, L. O.

Member Grade

Tanski, J. P., Asst. Forester, Pa. Dept. of Forests & Waters, Blain, Pa., Pa. State Univ., BSF, 1955 (Junior 1955).

Affiliate Grade

Hamer, J. C., J. P. Hamer Lbr. Co., Inc., Kenova, W. Va.

Appalachian Section

Junior Grade

Herron, L. E., Cons. Forester, Champion Paper & Fibre Co., Canton, N. C., Purdue Univ., BSF, 1950.

Porter, M. G., Forest Aide, Union Bag-Camp Paper Corp., Franklin, Va. (Affiliate 1954).

Students Eligible for Automatic Advancement

DUKE UNIVERSITY

Buckner, R. G.	Krick, W. P.
Chapman, R. C.	Murawski, J. S.
Davis, J. R.	Perryman, J. H.
Hanks, S. H.	Wilkinson, T. G.
Jennette, D. L.	Wolfskill, S. J.

NORTH CAROLINA STATE COLLEGE

Bonner, L. D.	Lennon, T. P.
Capps, W. C.	Lively, J. H.
Carr, D. G.	Lovin, H. G.
Coker, W. J.	Lupold, H. M.
Cooke, R. L.	Owens, E. G.
Davis, T. P.	Plowman, J. D.
Dodge, O. C.	Roten, D.
Duval, J. G. F.	Scanlon, D. H.
Gibbon, E. L.	Stonecypher, R. W.
Gilbert, R. O.	Sturgill, J. C.
Glass, P. D.	Sumner, L. B.
Gregg, S. W.	Tabor, C. A.
Griffin, E. V.	Walker, T.

Welch, R. V.

Central Rocky Mountain Section

Junior Grade

LaMay, T. W., Asst. Dist. Ranger, Yampa Dist., Yampa, Colo. (Reinstatement).

Swem, T. R., Regional Chief, Natl. Park System Planning, Omaha, Neb., Iowa State College, BSF, 1940.

Students Eligible for Automatic Advancement

COLORADO STATE UNIVERSITY

Baier, G. E.	Johnson, F. R.
Beaubien, R. D.	Lynch, D. L.
Crews, T. C.	Sloniker, E. V.
Davies, D. J.	Solether, R. B.
Day, E. D.	Springer, L. M.
Hoefer, D. R. W.	Stiger, E. M.
Hooper, J. E.	Swanson, R. H.
Joder, R. M.	Tabler, R. D.

Wolfe, J. A.

Central States Section

Junior Grade

Students Eligible for Automatic Advancement

PURDUE UNIVERSITY

Borem, D. G.	Nelson, M. E.
Born, J. D.	Patterson, L. W.
Browder, R. B.	Pitmon, W. C.
Cummings, W. H.	Rankin, D. C.
Dearth, T. F.	Schuckel, W. L.
Gee, S. R.	Shaw, D. L.
Hehenberger, D. T.	Simmers, U. J.
Henley, R. J.	Sutto, A. R.
Hughes, A. O.	Swartz, S. R.
Leeds, E. E.	Terry, A. L.
Maddock, T. L.	Tryon, C. P.
Naumann, J. R.	Watt, R. D.

Zernach, E. L.

Columbia River Section

Student Grade

OREGON STATE COLLEGE

Fallon, K. L.	McCall, B. R.

Withrow, R. N.

Junior Grade

Granger, R. A., Forester, Chief Joseph Lbr. Co., Joseph, Ore., Ore State College, BSF, 1952.

Main, R. F., Logging Eng., Mt. Emily Lbr. Co., Enterprise, Ore., Univ. of Wash., BSF, 1952.

Orr, P. W., Entomologist, Pacific Northwest Forest & Range Expt. Sta., Portland, Ore. (Reinstatement).

Pearson, B. O., Forester, USFS, Wallowa, Ore., Colo. State Univ., BSF, 1948.

Tucker, J. A., Logging Eng., C & D Lbr. Co., Riddle, Ore. (Reinstatement).

Students Eligible for Automatic Advancement

OREGON STATE COLLEGE

Appel, T. A.	Harvey, R. G.
Avery, S. H.	Irwin, R. L.
Bellan, D. D. J.	Johnstone, C. W.
Bowdish, D. M.	LaBar, F. R.
Buscher, R. F.	Martin, P. K.
Bye, R. H.	McClelland, D.
Chalmers, W. K.	Meyer, K. R.
Dolan, J. M.	Newton, M.
Ellison, W. H.	Peterson, C. M.
Ewart, R. K.	Pettey, R. A.
Fallon, K. L.	Shrum, M. D.

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Griggs, J. R.	Swain, K. M.
Gustafson, R. G.	Switzer, C. F.
Hailey, P. E.	Taylor, L. O.
Hall, N. L.	Weideman, G. A.
Hamilton, R. J.	Zontek, E. F.

Member Grade

Egan, P. H., Forester, Dwyer Lbr. Co., Estacada, Ore. (Junior 1951).

Kistner, D. R., Appraiser, Fish & Wildlife Service, Portland, Ore. (Junior 1951).

McMinn, D. R., Resident Forester, Crown Zellerbach, Vernonia, Ore. (Junior 1952).

Palen, K. R., Farm Forester, Hillsboro, Ore. (Junior 1952).

Skeele, J. R., Tbr. Sale Asst., Randle Dist., Randle, Wash. (Junior 1952).

Smith, J. R., Forester, Neal Creek Lbr. Co., Hood River, Ore. (Junior 1952).

Spada, B., Research Forester, USFS, Portland, Ore. (Junior 1952).

Strand, R. F., Research Forester, Crown Zellerbach, Comas, Wash. (Junior 1951).

Affiliate Grade

Brushe, H. C., Forester, Bur. of Land Mgmt., Salem, Ore. (Reinstatement).

McIlhenny, J. K., Asst. Ranger, USFS, Dufur, Ore.

Nance, E. S., Scaler, USFS, Portland, Ore.

Gulf States Section

Junior Grade

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The latter, principally ponderosa pine, Engelmann spruce, lodge pole pine and Douglas fir, is manufactured for both construction and finishing in the building industry, and shipped to markets throughout the country.

Of the state's commercial forest land —33% of the total forest area—88% is government controlled. 36% of this productive forest land is devoted to parks, monuments, and other areas reserved for recreation. In this category is Yellowstone, the country's first National Park, established in 1872, and the first National Monument, established in 1906.

Despite the importance and early start of Wyoming forest products in national markets, and their economic importance within the state (—basis of the state's 4th largest industry, they employ one out of every 4 industrially employed)—old growth timber occupies 39.2% of all Wyoming commercial forest lands. Among these mature trees, insects such as Black Hills beetle and Engelmann spruce bark beetle have killed twice as much timber as is harvested for use.

High insect damage has resulted in special salvage-logging operations with a dual purpose—to utilize infested timber while it is still sound and of good quality, and to remove insect broods from the woods, sparing other trees from attack and boosting the success of coincident spraying programs.

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LOUISIANA POLYTECHNIC INSTITUTE

Anthony, J. M. — Kay, D. R.
Colvin, T. A. — McGrew, H. E.
Dark, W. E. — Reitzell, R. V.
Gills, B. L. — Rockett, K. W.
Hall, J. W. — Tolar, A. M.
Istre, H. W. — Westbrook, R. F.

LOUISIANA STATE UNIVERSITY

Alford, S. G. — Harper, P. J.
Baker, J. R. — Keaton, E. E.
Barras, S. J. — Kennedy, W. A.
Boone, R. S. — Lotan, J. E.
Crowe, J. W. — Melancon, L. J.
Dalhoff, F. B. — Schulte, J. L.
Delk, T. R. — Squires, J. W.
Evans, M. J. — Vales, E. R.
Folsom, J. R. — Verucchi, S. J.
Germany, R. A. — Williamson, D. L.

Member Grade

Lehmann, A. F., Chief Forester, Angelina County Lbr. Co., Keltys, Texas (Reinstatement).

Shatford, J. S., Forester, International Paper Co., Natchez, Miss., L.P.I. BSF, 1954 (Junior 1955).

Affiliate Grade

Burrows, J. T., Forester, Holly Springs Natl. Forest, Holly Springs, Miss.

Associate Grade

Potts, S. F., Entomologist, Potts Feed Mill & Chem. Co., Crawford, Miss. (Reinstatement).

Inland Empire Section

Student Grade

IDAHO STATE COLLEGE

Waldron, H. M.

Intermountain Section

Junior Grade

Students Eligible for Automatic Advancement

UTAH STATE UNIVERSITY

Barker, R. N. — Kline, L. N.
Beaver, H. G. — Lillie, R. M.
Binando, J. — Oshima, E. M.
Cadzow, G. A. — Pangman, H. G.
Cahill, H. B. — Peterson, G. E.
Cloward, P. V. — Prince, J. M.
Dachler, R. E. — Rolfson, V. P.
Emden, A. C. — St. Andre, G. J.
Glenn, J. R. — Skabelund, P. H.
Hanson, M. L. — Stevens, G. J.
Hopson, T. D. — Thompson, J. E.
Jackson, N. R. — Vaughan, D. E.
Jensen, L. W. — Walker, P. J.
Keetch, M. R. — Wirth, A. W.

New England Section

Student Grade

UNIVERSITY OF MAINE

Foster, C. E. — Jackson, L. W.

Junior Grade

Students Eligible for Automatic Advancement

UNIVERSITY OF MAINE

Borgeson, A. E. — Hogan, E. P.
Campeau, D. J. — Kurrle, F. L.
Dubov, B. J. — Lindsay, J. J.
Foster, C. E. — Polanski, D. W.
Francis, M. J. — Solari, R. L.
Hannah, P. R. — Stansel, C. M.
Hardy, S. S. — Waite, D. A.
Hawes, G. H. — Walter, R. J.
Wood, D. C.

UNIVERSITY OF MASSACHUSETTS

Federer, C. A. — Lampi, A. O.
Guarnaccia, D. — Rich, J. P.

YALE UNIVERSITY

Brooke, R. C. — Funsch, R. W.
Chalinor, D. — Peterson, E. B.
DeBrunner, L. E. — Phillips, J.
Dent, A. G. — Scott, B. D.
Swearingen, J. W.

New York Section

Junior Grade

Students Eligible for Automatic Advancement

STATE UNIVERSITY OF NEW YORK

Barth, R. A. — Leys, A. J.
Brooks, C. F. — Milanese, R. P.
Bulsiewicz, F. W. — Miller, A. W.
Chasey, K. D. — Opdyeke, J. B.
Dutcher, J. E. — Peaslee, A.
Fedde, G. F. — Raushi, R. G.
Fialko, L. D. — Reed, R. E.
Field, E. A. — Smith, R. E.
Frommer, C. H. — Sundt, A. A.
Gruetzke, J. E. — Thornton, L. H.
Hotopp, K. R. — Ulbrich, R. A.
Jones, M. H. — Watterston, K. G.
Karsch, E. A. — White, D. E.
Winieski, J. A.

Associate Grade

Morrison, J. L., State Univ. of N. Y., Syracuse, N. Y. (Reinstatement).

Volmes, P. B., Instructor, State Univ. of N. Y., Syracuse, N. Y.

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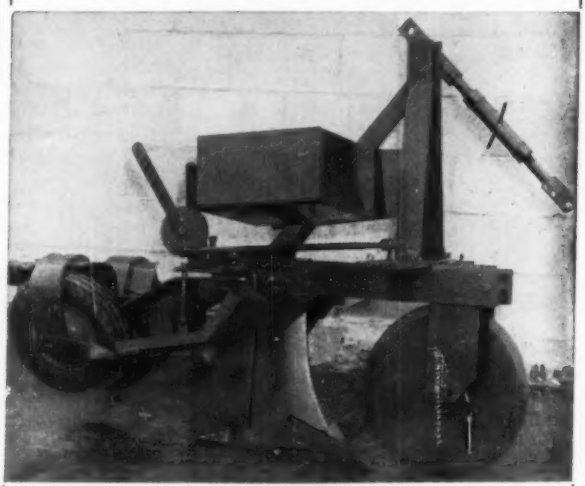

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Northern California Section

Junior Grade

Lambert, G. M. J., Asst. Sales Mgr., Simpson Redwood Co., Arcata, Calif. (Reinstatement).

May, G. M., Valuation Eng., Internal Revenue Service, San Francisco, Calif. (Reinstatement).

Students Eligible for Automatic Advancement

UNIVERSITY OF CALIFORNIA

Butler, W. E.	Kaiser, W. J.
Campbell, D. R.	Lord, P. H.
Cannon, W. M.	McKinnon, R. L.
Clifford, J. J.	Morgan, G. D.
Conner, L. T.	Parady, R. A.
Dennison, W. N.	Perkins, R. A.
Ferrell, G. T.	Potter, D. A.
Goodacre, G. R.	Schaub, F. L.

Ziemer, R. R.

Associate Grade

Miller, D. H., Meteorologist-hydrologist, Calif. Forest & Range Expt. Sta., Berkeley, Calif.

Northern Rocky Mountain Section

Junior Grade

Woffenden, H. S., Tbr. Mgmt. Asst., Kootenai Natl. Forest, Libby, Mont., Mont. State Univ., BSF, 1954.

Students Eligible for Automatic Advancement

MONTANA STATE UNIVERSITY

Belau, L. R.	Lichlyter, B. R.
Blunn, T. C.	McCullough, W. G.
Cates, R. G.	Mitchell, J. L.
Challinor, H. C.	Novak, R. A.
Chehock, C. R.	Paquin, R. H.
Day, A. C.	Raugutt, R. L.
Duke, J. P.	Saxton, L. F.
Ebel, F. W.	Squire, T. G.
Erdmann, G. G.	Stoops, R. R.
Gragg, J. F.	Tribe, C. B.
Kalkoske, G. A.	Wolfer, R. H.

Wright, C. E.

Member Grade

Crowe, R. A., Lbr. Sales Mgr., Missoula White Pine Sash Co., Missoula, Mont., Pa. State College, BSF, 1951 (Junior 1955).

Swift, B. A., Dist. Ranger, West Fork Ranger Dist., Darby, Mont., Mich. State Univ., BSF, 1951 (Junior 1955).

Ozark Section

Junior Grade

Phares, R. E., Research Forester, USFS, Salem, Mo. (Reinstatement).

Students Eligible for Automatic Advancement

UNIVERSITY OF MISSOURI

Ashton, A. W.	Hulse, F. G.
Austin, S. B.	Koelling, M. R.
Benton, R. O.	Lackey, T. D.
Bolm, R. C.	Lichterman, L. L.
Brunk, E. L.	Miller, H. N.
Carter, W. B.	Mokry, T. J.
Cochran, R. B.	Niewald, A. E.
Colvin, P. F.	Rice, H. W.
DeVoto, D. F.	Rollens, D. L.
Dooling, O. J.	Runyon, N. E.
Gann, L. W.	Speight, H.
Harris, J. D.	Turley, D. G.
Hart, G. A.	Vaughn, J. D.
Huggans, J. L.	Vinson, J. A.

Member Grade

Tobin, W. T., Forester, USFS, Glenwood, Ark., Mich. State Univ., BSF, 1950 (Junior 50R54).

Affiliate Grade

Bryant, J. R., Dist. Forester, Dierks Forest Inc., Hollis, Ark.

English, E. H., Dist. Forester, Ark. State Forestry Comm., Sheridan, Ark. (Reinstatement).

Jenkins, J. W., Student, Ark. A & M College, College Heights, Ark.

Johnson, R. A., Asst. Block Forester, Fordyce Lbr. Co., Fordyce, Ark.

Puget Sound Section

Junior Grade

Foldi, F. S., Forester, Crown Zellerbach Corp., Port Angeles, Wash. (Reinstatement).

Merritt, J. C., Forester, USFS, Darrington, Wash. (Reinstatement).

Nattinger, J. A., Forester, Natl. Park Service, Port Angeles, Wash., Univ. of Wash., BSF, 1949.

Students Eligible for Automatic Advancement

UNIVERSITY OF WASHINGTON

Atterbury, T.	Kringle, P. R.
Azeltine, E. L.	Landis, G. W.
Bowman, R. M.	Long, R. L.
Brocard, N. G.	Lustie, A. C.
Bryant, R. L.	Matthews, R. P.
Clancy, R. P.	Palmer, C. H.
Cook, T. H.	Pomeroy, W. L.
Dobbs, R. C.	Prater, C. D.
Dowdell, D. G.	Proutt, J. M.
Emery, D. N.	Rolph, L. C.
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Knotek, D. R.	Smith, B. O.
Knutson, H. S.	VanCleve, K.

Woodman, J. N.

Affiliate Grade

Swerin, R. C., Area Forester, Rayonier, Inc., Forks, Wash.

Southeastern Section

Student Grade

Olds, W. T. (Reinstatement)	Stephens, E. J. (Reinstatement)

UNIVERSITY OF GEORGIA

Bolton, R. G.	Rogers, M. G.
Rogens, C. E.	Watson, R. A.

Junior Grade

Allen, H. P., Dist. Forester, Ga. Forestry Comm., Camilla, Ga. (Reinstatement).

Crowson, P. R., Forester, Union Bag-Camp Paper Corp., Savannah, Ga., Univ. of Fla., BSF, 1956.

Curtis, F. H., Mgmt. Planning Forester, Buckeye Cellulose, Foley, Fla. (Reinstatement).

McCafferty, W. E., Forester, Union Bag-Camp Paper Corp., Homerville, Ga., Pa. State Univ., BSF, 1958.

Olds, W. T., U. S. Army, Fort Bragg, N. C., Univ. of Fla., BSF, 1958.

Prouty, L. E., Plywood Dealer, International Paper Co., Monroeville, Ala. (Reinstatement).

Stephens, E. J., Forester, Union Bag-Camp Paper Corp., Louisville, Ga.,

Univ. of Ga., BSF, 1955, Duke Univ., MF, 1956.

Stewart, D. L., Asst. Dist. Forester, Ga. Forestry Comm., Camilla, Ga. (Reinstatement).

Students Eligible for Automatic Advancement

ALABAMA POLYTECHNIC INSTITUTE

Arnold, B. G.	Haney, H. L.
Doughtie, N. C.	Howell, J. E.
Earnest, O. B.	Moran, R. H.
Goodman, J. H.	Paul, T. W.
Griffis, L. G.	Pepper, W. D.
Guinn, L. S.	Ricketts, J. C.

Sampson, O. R.

UNIVERSITY OF FLORIDA

Folson, R. L.	Kidd, P. D.
Godfrey, C. W.	Leonard, B. H.
Henderson, W. B.	Spence, E. A.
Jones, T. S.	Whitman, J. D.

Williams, H. R.

UNIVERSITY OF GEORGIA

Atkinson, R. T.	Liles, J. P.
Beatty, C. W.	Long, J. G.
Beckham, W. C.	Lovin, M. H.
Brewer, J. C.	McDonald, R. B.
Castleman, J. L.	Miles, B. P.
Catlett, J. A.	Mosteller, R. E.
Chesser, G. S.	Murphy, R. N.
Cook, T. P.	NeSmith, J. E.
Davis, H. T.	O'Hagan, J. L.
Dockery, E.	Pirkle, J. J.
Enderfield, B. G.	Rigdon, S. T.
Everett, C. H.	Robertson, J. A.
Gardner, P. E.	Rogens, C. E.
Garris, G. R.	Rogers, M. G.
Hambrick, H. T.	Rogers, M. H.
Hawley, L. L.	Saville, A. K.
Helmly, D. F.	Smith, V. T.
Hogan, M. J.	Tyre, R. L.
Johnson, A. S.	Vinson, M. C.
Johnson, H. H.	Williams, C. R.
Kelly, R. E.	Williams, R. F.
Kitchings, F. D.	Wilson, C. J.

Wilson, J. R.

Member Grade

Bielling, P. E., Asst. Ranger, Ocala Natl. Forest, Ocala, Fla., Univ. of Fla., BSF, 1955 (Junior 1955).

Sahlie, W. F., Procurement Forester, St. Regis Paper Co., Montgomery, Ala., Univ. of Fla., BSF, 1955 (Junior 1955).

Southwestern Section

Junior Grade

Doty, W. M., Dist. Ranger, USFS, Magdalena, N. M. (Reinstatement).

Elson, T. E., Forester, Coconino Natl. Forest, Flagstaff, Ariz., Colo. State Univ., BSF, 1959.

Upper Mississippi Valley Section

Student Grade

UNIVERSITY OF MINNESOTA

Brown, J. A. Eggen, D. L.
Jensen, G. L.

Students Eligible for Automatic Advancement

IOWA STATE UNIVERSITY

Baker, D. P.	Polenz, A. R.
Brown, D. B.	Roth, P. S.
Brown, G. N.	Sieverding, H. P.
Cline, R. W.	Spolar, T. J.
Cooper, T. G.	Starke, R. K.
Dyrland, R. D.	Swanson, W. S.
Ficke, J. E.	Syndergaard, L. E.
Hillman, K. W.	Teeters, J. L.
Kasile, J. D.	Tyrrel, R. R.
Leary, R. A.	Van Zandbergen, R. L.
Nelson, D. K.	Wright, J. A.
Pipho, H. L.	

Washington Section

Member Grade

Hartman, F. J., Vice Pres., Air Survey Corp., Arlington, Va. (Reinstatement).

Wisconsin-Michigan Section

Student Grade

MICHIGAN COLLEGE OF MINING & TECHNOLOGY

O'Donnell, W. A.

MICHIGAN STATE UNIVERSITY

Herrett, A. R.

UNIVERSITY OF MICHIGAN

Williams, R. J.

Junior Grade

Students Eligible for Automatic Advancement

MICHIGAN COLLEGE OF MINING & TECHNOLOGY

Booker, R. G.	Lehrer, G. F.
Cook, W. L.	Olson, A. G.
DesJardin, J. G.	Sajdak, R. L.
Dufour, F. X.	Stadelman, C.
Gleason, G. C.	Theisen, P. A.
Heikkinen, D. A.	Tucker, G. F.
Kirschbaum, J. W.	Vanderlin, O. J.

MICHIGAN STATE UNIVERSITY

Beauregard, M. J.	Kubiske, A. F.
Bilecky, A.	Kuehne, M. J.
Conkle, M. T.	Lacasse, L. R.
Cutsforth, M. M.	Mann, W. K.
Eising, P. L.	McCumber, J. E.
Gainstead, J. E.	Plume, V.
Hohisel, N. S.	Ward, G. R.
Hull, R. D.	Young, D. A.

UNIVERSITY OF MICHIGAN

Cameron, C. D.	Schaefer, O. E.
Lupfer, W. B.	Swanson, D. O.
Norris, D. B.	Vance, J. A.

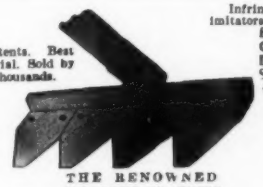
Member Grade

Montgomery, W. J., Forester, Mich. Dept. Cons., Lansing, Mich., Univ. of Mich., BSF, 1954 (Junior 7954).

No Section

Corresponding Grade

Kim, Yungjoon, Chief, ROK Bur. of Forestry, Seoul, Korea.



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Forestry News

U. S. Forestry Team Goes to Russia

A delegation of forestry experts left for the U.S.S.R. July 17 to observe and evaluate Russian progress in all phases of forestry. The 7-man team from the United States is one of the technical exchange delegations under an agreement reached last year by the U. S. Government and the U.S.S.R. A Russian forestry group will visit the United States beginning in August or September of this year.

The American foresters are headed by George M. Jemison, Deputy Assistant Chief for Research, Forest Service, Washington, D. C. Other team members are:

Scott S. Pauley, School of Forestry, University of Minnesota, St. Paul, Minn.

G. A. Garratt, SAF President and Dean of the Yale University School of Forestry, New Haven, Conn.

Alex J. Panshin, Department of Forest Products, Michigan State University, East Lansing, Mich.

R. J. Seidl, Simpson Timber Company, Seattle, Wash.

E. P. Stamm, Crown Zellerbach Corporation, Portland, Ore.

L. J. Metz, U. S. Forest Service, Asheville, N. C.

The forestry delegation will be travelling extensively in Russia until their return August 19. Major centers to be visited include Moscow, Leningrad, Archangel, Kirov, Voronezh, Kiev, Kherson, and Krasnoyarsk. They expect to visit forestry operations in the field, research institutions, universities, wood processing plants, and obtain a good cross-section of all Russian forestry activities.

Pacific Southwest Forest and Range Experiment Station

Dedication ceremonies were held June 3 in Berkeley, Calif., for the Pacific Southwest Forest and Range Experiment Station. Formerly known as the California Forest and Range Experiment Station, and housed in Mulford Hall at the University of California, the renamed research center is now in a new building at 1960 Addison Street.

Keith Arnold, director, presided at the ceremonies. Among the speakers were V. L. Harper of Washington, D. C., assistant chief of the U. S. Forest Service Branch of Research; DeWitt Nelson, director of the California De-

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SOIL CONSERVATION Commemorative Postage Stamp Announced. A 4-cent postage stamp saluting progress in soil conservation in the United States will be issued August 26 by the Post Office Department.

The nation's first soil conservation stamp will be formally released at the annual meeting of the Soil Conservation Society of America at Rapid City, S. D., August 26. It will go on sale the following day at post offices throughout the country.

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NEW HEADQUARTERS building for the Pacific Southwest Forest and Range Experiment Station, Forest Service, U. S. Department of Agriculture, in San Francisco, Calif.

partment of Natural Resources, Sacramento; T. R. Yocum of the Simpson Timber Company, Seattle, Wash.; and Daniel E. Aldrich, dean of agriculture at the University of California.

Introduced to the audience were former station directors E. I. Kotok, S. N. Wyckoff, and M. W. Talbot.

F. I. Righter, director of the Forest Genetics Institute at Placerville, Calif., received a special citation from the Department of Agriculture for his work in breeding superior forest trees.

The Society of American Foresters was represented by Henry Clepper, executive secretary.

Forest Fires Under 100,000 Mark for Second Year

The total number of forest fires was under the 100,000 mark for the second year in a row in 1958 with 97,910 fires reported, the U. S. Department of Agriculture has announced.

"We can thank the American people for this second best year on record," said Richard E. McArdle, chief of the Forest Service. "Although it doesn't quite equal the 1957 all-time low of 83,392 fires, the area burned was the lowest ever—3,280,000 acres.

"People have become increasingly conscious of forest fire prevention. We believe the Smokey Bear Campaign sponsored by The Advertising Council for the State Foresters and the Forest Service, and the Keep America Green programs of the States and forest industries have contributed much to this awareness."

The 1958 record adds up to 268 fires a day, or one every 5½ minutes. This compares to 422 fires a day 5 years ago (1953) when 154,160 fires burned 9,975,700 acres.

Statistics compiled by the Forest Service are based on reports from its field offices, state foresters, the Department of the Interior, and the Tennessee Valley Authority. They do not include the 275 fires in Alaska which burned 314,857 acres. Starting with the current year, Alaskan fires will be included in the summary.

The forest fire picture is not all rosy. Millions of acres still receive too little or no protection. About 36 million receive no organized protection at all. Records show that 5 percent of the unprotected lands burned in 1958 while only 1/4 of 1 percent of protected lands burned.

An additional 200 million acres are not adequately protected to meet possible disastrous fires.

Still causing most forest fires nationwide are incendiarists, debris burners, and smokers. In 1958 they started 19,581; 18,316; and 14,171 forest fires respectively on protected lands. (There is no breakdown of fires by causes on unprotected lands.) Lightning caused 10,828 fires.

Pennsylvania Contest Draws Wide Participation

At the 72nd annual meeting of the Pennsylvania Forestry Association, May 22-23, its president, Lloyd E. Partain, announced the winner of the Associations' contest to name its "Good Outdoor Manners Racoon," pictorial symbol of the Association's Good Outdoor Manners Project. (See page 233 of the March Journal.)

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Charleroi, Pa., was awarded a $200 savings bond for picking the name "Howdy the Racoon." He chose the name because the raccoon "welcomes you to his home, the forest, if you obey the rules of a good guest."

Partain reported that the contest, launched in January, drew entries from more than 48,000 Pennsylvania school children, with every county in the state represented.

Howdy's portrait will be displayed on posters throughout the state along roads, in parks, and the many places where people gather for outdoor recreation.

Private & Industrial

Miles Named Gulf States Vice President

R. Vance Miles, Jr. has been elected to vice president-forestry by Gulf States Paper. The announcement was made by Gulf States' president Jack Warner following the spring meeting of the company's board of directors.

Miles joined Gulf States Paper in 1942 after ten years with the U. S. Forest Service. When the company's forestry division was organized in 1949, he was named its manager.

J. VANCE MILES, JR.

The new vice president served as president of the Southern Pulpwood Conservation Association during 1954. He has been chairman of the Southeastern Section, Society of American Foresters and chairman of the Alabama Forestry Council. Miles was the first head of the "Keep Alabama Green" program. He is a trustee of the Alabama Academy of Science.

He is an honorary vice president of the American Forestry Association, a director of the Forest Farmers Association, and vice chairman of the Alabama State Board of Registration for Foresters.

Crown Zellerbach Reports on Reforestation

Crown Zellerbach Corporation's Northwest timber department has announced the planting and seeding of 5,604 acres of forest land on the company's western Oregon and Washington lands during the 1958-59 planting season.

Tree planters hand planted 1,756,150 two-year-old seedlings on 3,406 acres. Helicopters seeded 2,168 acres and hand seeding accounted for the remaining 30 acres. Species planted included Douglas-fir, Sitka spruce, grand fir, silver fir, noble fir, Monterey pine, and cottonwood.

Since World War II, Crown Zellerbach has reforested 55,000 acres on its Northwest tree farms. Over 17 million seedlings were planted on these lands during this period.

Most of the Company's planting stock is grown from selected seed col-

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RECREATIONAL USE OF WILD LANDS By C. Frank Brockman, Professor of Forestry, College of Forestry, University of Washington. *McGraw-Hill American Forestry Series.* 346 pages, $8.50.

FOREST FIRE: CONTROL AND USE by Kenneth P. Davis, Professor of Forest Management, and Chairman of the Department of Forestry, School of Natural Resources, University of Michigan. *McGraw-Hill American Forestry Series.* 584 pages, $12.00

NATURAL RESOURCES by M. R. Huberty, Department of Engineering, University of California, Los Angeles; and W. L. Flock, Associate Engineer and Lecturer, Department of Engineering, University of California, Los Angeles. *McGraw-Hill UCLA Extension Series.* 556 pages, $11.00.

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lected on Crown Zellerbach land which is then sent to the forest industries' Colonel W. B. Greeley Nursery near Nisqually, Wash.

During its long reforestation history, the Company has planted or seeded 62,727 acres of its Northwest lands.

Two Named to Industrial Forestry Association Positions

Thomas E. Cochran has been appointed district forester for the Industrial Forestry Association at Eugene, Ore., to supervise the Association's Tree Farm Program in that area, according to W. D. Hagenstein, executive vice president.

Cochran, a 1952 graduate of the Department of Forestry, Iowa State College, has been employed since graduation in the Forestry Department of the St. Paul & Tacoma Lumber Company as resident forester on its tree farm near Tacoma, Wash.

T. E. COCHRAN

B. C. WILSON

He served in the U. S. Coast Guard in World War II.

Boyd C. Wilson has been appointed forester on the staff of the Association at Nisqually, Wash. He will work under the supervision of Dr. J. W. Duffield, technical director of the Association's forest tree improvement program in helping establish seed orchards for growing improved seed for the Association's Forest Nursery.

Wilson served as an instructor in guided missles in the U. S. Army at Fort Bliss, Texas, was graduated from the College of Forestry, University of Washington in 1958 and has been engaged in nursery work for the Washington Department of Natural Resources.

Named Assistant Manager of Veneer Plant

The new assistant manager of Georgia-Pacific Corporation's hardwood veneer plant in McKeever, N. Y., is Robert L. Larson, formerly with the company's Toledo, Ore., plywood division. Larson has been with the company since 1955.

He is a forestry graduate of Oregon State College and a member of the Society of American Forestry.

G. E. Brown is manager of the McKeever plant.

Public

CHALMER K. LYMAN

Chalmer K. Lyman Named Director of Forest Service Personnel

Chalmer K. Lyman, assistant regional forester, Upper Darby, Pa., was named director of the U. S. Forest Service Division of Personnel Management, Washington, D. C., effective July 1.

Mr. Lyman succeeds Lynne Correll, who retired June 30 after almost 33 years of service. About 25 of those years were in personnel work in the California and Eastern Regions and in Washington.

During his two years as director, Mr. Correll streamlined the personnel management processes and worked untiringly for satisfying and productive careers for employees by developing individual growth and improvement.

In Upper Darby Mr. Lyman has been chiefly concerned with personnel

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work, his time being divided between this and the administrative management phases of Forest Service activities of the Eastern Region.

Before his transfer to Upper Darby in 1957, Lyman spent three years in Washington, first in the Forest Service's Division of Administrative Management, and subsequently as assistant to the director of the Division of Fire Control.

Born in Montana, Mr. Lyman graduated with a BS degree in forestry from Montana State University in 1938. His Forest Service career has included various assignments in Idaho, California, Montana, and Washington State.

WALFRED J. MOISIO

Named Okanogan Supervisor

Promotion of Walfred J. Moisi to forest supervisor, Okanogan National Forest with headquarters in Okanogan, Wash., has been announced by J. Herbert Stone, regional forester, Pacific Northwest Region, U. S. Forest Service, Portland, Ore. Moisio replaces Chester A. Bennett who retired at the end of June.

Since 1957, Moisio has been staff officer in the Division of Recreation and Lands in the regional office at Portland. Moisio came to the regional office from the Siuslaw National Forest in Corvallis. There he served as timber management staff officer on the supervisor's staff for three years and as district ranger, Mapleton District, for one year.

Moisio began his Forest Service career on the Mt. Hood National Forest in 1929 in fire control and mainten-

ance work. In 1932 he received a B.S. degree in forestry from Oregon State College. Two years later he accepted appointment with the U. S. Forest Service in Missouri where his experience included work as district ranger, staff officer of the timber war production project, and range staff officer on the supervisor's staff.

In 1946 Moisio was transferred back to the Pacific Northwest Region as district ranger of the Skagit District, Mt. Baker National Forest. He held this position until his transfer to the Siuslaw National Forest in 1953.

Lexen Joins Agricultural Research Service

Bert R. Lexen, formerly assistant director, Division of Forest Management Research, U. S. Forest Service, Washington, D. C., has transferred to the Agricultural Research Service, U. S. Department of Agriculture.

In his new position as assistant chief of the Foreign Research and Technical Programs Division of A.R.S. Mr. Lexen will be concerned with the administration of research programs under Public Law 480. Under section (k) of this act research is conducted in forestry as well as in agricultural commodities.

Payment for the research will be made in the form of both grants and contracts from foreign currencies accruing from the sale of surplus commodities to foreign countries. The research will be done at foreign scientific institutions.

Lexen came to Washington in 1951 from Fort Collins, Colo., where he was chief of the Division of Forest Management Research of the Rocky Mountain Forest and Range Experiment Station. In his new position he will give particular attention to research in Latin America.

Glazebrook Transferred to Regional Logging Engineer Post

Transfer of Thomas B. Glazebrook from the Washington Office of the U. S. Forest Service to the Division of Timber Management in the Pacific Northwest Region, Portland, Ore., has been announced by regional forester J. Herbert Stone. Glazebrook will be assigned as regional logging engineer, replacing David R. Gibney who was recently transferred to the position of forest supervisor on the Willamette National Forest.

Glazebrook received a B.S. degree in forestry from Purdue University in 1939 and an M.S. from the University of Idaho in 1941. He had military service with the US Army from 1942 to 1946 in an engineering forestry company, serving in Alaska, Germany, and the Philippines.

Glazebrook first started to work for the Forest Service in 1939 as a seasonal employee in Idaho. In 1946 he received his appointment as a forester on the El Dorado National Forest in the California Region. Subsequent assignments in Region 5 took him to the Modoc National Forest, the Regional Office in San Francisco and the El Dorado, Stanislaus and Klamath National Forests. He was transferred from the Klamath to the Washington Office of the Forest Service as assistant to the chief of logging engineering. During his two years' assignment in Washington he assisted in the revision of the Timber Appraisal section of the Timber Management Handbook.

Heads Oregon Center Products Research

Leif D. Espenas, chief of the physical division of forest products research at the Oregon Forest Research Center in Corvallis, has been named acting director of products research by the Forest Protection and Conservation Committee and the Oregon State Board of Forestry. He succeeds John B. Grantham, who resigned recently to accept the position of chief of Forest Utilization Research at the Pacific Northwest Forest and Range Experiment Station in Portland.

A forest products research staff member for 13 years, Espenas has been division chief since 1953. He received his Bachelor's Degree from New York State College of Forestry in 1938 and his Master's Degree from the University of California in 1940.

Espenas first joined the staff in 1947 after having worked several years in the timber industry in various capacities, and heading up seasoning research for five years at the U. S. Forest Products Laboratory in Madison, Wisc.

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TVA Sponsors Series of Utilization Meetings

More than a hundred timber industry people from northwest Alabama and northeast Mississippi attended a waste utilization conference held May 15 at Red Bay, Alabama. Purpose of the meeting was to focus attention on trends in the sawmill industry with particular emphasis on the chipping of sawmill residue for use by paper mills. Last year this so-called "waste" accounted for about 10 percent of the wood used by paper mills in the South and grossed the sawmill industry in the area an estimated $24,000,000.

According to information presented at the meeting by John W. Lehman, chief of the Utilization Section, TVA Division of Forestry Relations, a sawmill operator with a market for "clean" mill waste, who produces between 8 and 10 thousand board feet of lumber a day, can profitably install a log debarker. An operator with a market for chips, who produces 10 to 15 thousand board feet or more a day, can profitably put in both a log debarker and a waste chipper.

Ernest Clevenger, vice president of Corley Manufacturing Company, reported a rapid trend away from small portable sawmills toward larger stationary mills incorporating labor-saving machinery and waste utilization equipment.

The conference was one of a series of similar meetings being held throughout the Tennessee Valley. Sponsors of this meeting and one at Cullman, Alabama, April 15, included C. Arnold and Son, Inc.; Herman A. Keeton Lumber Company; Alabama Department of Conservation, Division of Forestry; Alabama Forest Products Association; and TVA Division of Forestry Relations.

Anderson Succeeds Jones as Regional Engineer

Arval L. Anderson was transferred to Missoula, Mont. July 1 as assistant regional forester in charge of the Division of Engineering for the Northern Region of the U. S. Forest Service, according to Chas. L. Tebbe, regional forester. He moved from a similar position in the Intermountain Region, Ogden, Utah, where he has been stationed since 1938.

As regional engineer, Mr. Anderson succeeds Howard R. Jones who retired June 30 after nearly 30 years with the Forest Service.

Rocky Mountain Region Biologist Appointed

A.F.C. Greene, until recently director of the Wyoming State Game and Fish Department, has been appointed acquatic biologist for the Rocky Mountain Region of the U. S. Forest Service. This announcement was made in June by Donald E. Clark, regional forester.

Following graduation from the University of Wyoming, Greene served with the U. S. Army during World War II in the European Theatre and upon release was appointed director of fisheries for the Wyoming department. In 1955 he was named to head the department. In his new position he will work in cooperation with state game and fish departments of the Region in fisheries and wildlife management.

Schools

Fletcher Named to Head Penn State Forestry

Dr. Peter W. Fletcher, professor of forestry at the School of Forestry, University of Missouri, has been named to the post of director of the School of Forestry at Pennsylvania State University. He took over his new duties in July, succeeding Maurice K. Goddard.

Mr. Goddard, named director of the school in 1954 was on leave of absence 1955-1958 serving as Secretary of the Pennsylvania Department of Forests and Waters. He was subsequently named for a second four-year term in the post, at which time he resigned the school's directorship. William C. Bramble, now head of the Department of Forestry and Conservation at Purdue University, served as acting director during most of the period of Mr. Goddard's absence, H. Norton Cope so serving from July 1, 1958.

Fletcher, a 1933 forestry graduate of Penn State, received his Master's from Yale in 1934, and his Ph.D. (Soils) from the University of Missouri in 1950. Excluding military service, he

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was with the U. S. Forest Service from 1934 to 1948, when he entered the teaching field. He was a ranger on the Mark Twain National Forest, Missouri, and fire control assistant on the Huron, Michigan, before joining the Southeastern Forest Experiment Station where he worked first on forest influences research and then soil and water research.

Member of a number of scientific honorary fraternities, Dr. Fletcher in 1948 received the Department of Agriculture's Superior Service Award. He has been active in the SAF, serving as vice chairman and chairman of the Ozark Section, and as vice chairman and chairman of both the Division of Watershed Management and the Division of Education. He is a member also of the Ecological Society of America, the American Geophysical Union, and the Soil Science Society of America. He is the author of numerous scientific and professional papers, articles, and bulletins.

During World War II, Fletcher was a photographic interpretation and intelligence officer with the Navy, serving in the Pacific Theatre.

Washington Products Institute Now Part of University

The Washington Institute of Forest Products has become the research arm of the University of Washington College of Forestry.

The Institute, a forestry research agency of the state government since 1947, has occupied offices on the campus for the past 10 years. College of Forestry faculty and graduate students have conducted many projects for the Institute.

Recent legislation placed the Institute under the administrative control of the University.

Gordon D. Marckworth, dean of the College of Forestry, will be director of the Institute. Donald H. Clark, assistant director, will be in charge of Institute operations.

Dean Marckworth said the new arrangement will make possible an expanded research program in the college.

Westing Appointed to Purdue Staff

Arthur H. Westing has been appointed to the position of assistant professor of forestry in the Department of Forestry and Conservation at Purdue University. He had this year

PETER W. FLETCHER

received his Ph.D. in forestry from Yale University.

Dr. Westing graduated from Columbia University with an A. B. in 1950 and obtained the M. F. degree from Yale in 1954. He has been a Fellow at Yale under a John A. Hartford Foundation grant. For one year he worked as a research forester at the Lake States Forest Experiment Station.

THE UNIVERSITY OF MICHIGAN'S champion sawyers, Robert Martin and Dareld Davis, winning Midwest Forestry Conclave two-man bucking contest.

Michigan Wins Midwest Forestry Conclave

The team from the School of Natural Resources of the University of Michigan walked off with top honors at the sixth annual Midwest Forestry Conclave held on May 9 at the Cloquet Experimental Forest of the University of Minnesota. Michigan's final score was 23-3/5 points, followed in order by Purdue University, 19-1/5 points; University of Minnesota, 18-3/5; Michigan State University, 11; Michigan College of Mining and Technology, 10-3/5; and Iowa State University with 5.

Highlighting Michigan's winning effort was the outstanding work of their star woodsman, Robert Martin, who ac-

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Index to Advertisers

	Page
Adirondack Forestry, Inc.	622
Aermotor Co.	610
Banzhaf, George & Co.	621
Bartlett Mfg. Co.	607
Belanger & Bourget	620
Calvert School	608
Caterpillar Tractor Co.	3rd Cover
Coile, T. S.	622
Crank, Porcius F. Jr.	623
Cranston, Keith	620
Cruise-Master Prisms	616
Dow Chemical Co.	546
Dratz, William D.	622
Eastman, Wm. A. Jr.	621
Evans Printing Co.	619
Fechheimer Bros. Co.	616
Forest Seeds of California	619
ForestView Evergreen Nursery	617
Forestry Suppliers, Inc.	614
Garrett Enumclaw Co.	604
Greenacres, Inc.	623
Guthrie, John G.	621
Hale Fire Pump Co.	615
Hall, Albert G.	621
Hall, Jack M.	622
Hammon, Jensen & Wallen	620
Haynes Mfg. Co.	610
Homelite Corporation	4th Cover
Hooker, Gion B.	622
Intermountain Timber Service	621
International Harvester Co.	584, 585, 613
Keene Forestry Association	616
Knapp, Ed. Co.	623
Lemieux, Frank J.	622
Lind, A. L. Co.	616
Lowther, Harry A. Co.	619
McCulloch Corporation	602, 603
McGraw-Hill Book Co.	618
Meadows, Ben Co.	604
Motorola	609
Musser Forests, Inc.	607
National Agricultural Supply Co.	604
Nelson Co.	605
Northern Tree Co.	621
Pacific Weather Service	607
Panama Pump Co.	607
Pomeroy & McGowin	621
Prentiss & Carlisle	623
Price, Wm. H.	621
Republic Aviation	606
Rich, C. H. Forest Fire Tool Co.	615
Rootspred Tree Planter	614
Sanders, Paul M.	623
Sebrell, J. B. Co.	608
Sewall, James W. Co.	620
Shannon, R. B. & Assoc.	620
Silva, Inc.	616
Smith, D. B. & Co.	2nd Cover
Southern Coatings & Chem. Co.	611
Southern Seed Co.	608
Steigerwaldt, Edward F.	622
Stock, John W.	622
Sunerest Evergreen Nurseries	616
Tree Farm Mgmt. Service	623
Troxler Electrical Laboratory	619
Utility Tool & Body Co.	616
Western Fire Equipment Co.	612
Western Timber Service	621
Whitfield, R. A. Mfg. Co.	612
Winslow, Paul T.	622
Wolff, William J.	617

counted for 17½ points all by himself. Martin won first place in plant identification, in chopping, and in one-man bucking, and he paired up with Dareld Davis to win the two-man bucking contest.

Minnesota's host team and the 35-man group from Purdue battled with the Michigan representatives right down to the finish before the winner was decided. Purdue had won for the past four years and did not give up their championship without a real struggle.

The University of Michigan will be host to the 1960 Conclave at the Proud Lake Recreational Area near Ann Arbor.

Allied

Forest History Foundation Elects Fellows

Two foresters, two businessmen, and a journalist were accorded special honors at the thirteenth annual meeting of the Forest History Foundation, Inc., at St. Paul, Minn., June 17.

Dr. Theodore C. Blegen, president of the Foundation, announced the election of five Fellows of the Foundation: Ben S. Allen of Lower Lake and Palo Alto, Calif., former Associated Press correspondent and public relations counsel to the California Redwoods Association and Redwood Region Conservation Council; Jay P. Kinney, Hartwick, N. Y., former chief supervisor of forests for the Indian Service and more recently special forestry counsel to the U. S. Department of Justice; Bryan Latham of London, England, Chairman of James Latham, Ltd., and of Nigerian Hardwood Company, Ltd.; Edward N. Munns, Concord, Calif., retired chief of the Division of Forest Influences, U. S. Forest Service, and currently representing Nature's Conservancy, Inc., in Washington, D. C.; and Charles H. Sage of Neenah, Wis., and Paicines, Calif., retired vice-president of Kimberly-Clark Corporation and long-time leader in the pulp and paper industries of both Canada and the United States.

The newly-elected Fellows of the Foundation received citations for "outstanding contributions in the fields of philanthropy, research, writing, collecting, and preserving the sources of forest history, especially that of the North American continent." The election marked the third time in the thirteen-year history of the Foundation that such honors have been awarded. Only twelve Fellows have been elected to date.

Forestry Employment

S.A.F. members are privileged to insert one 60-word advertisement in this column without charge. Forest industries desiring to employ foresters may insert advertisements at the rate of $4 per column inch. Copy must be received by the end of this month for an advertisement to appear in the issue after next.

Obviously the Society cannot assume responsibility beyond making it possible for prospective employee and employer to enter into negotiations.

Position Available

District forester, to open new forest district. Will work in the fields of forest management, planting, and public relations. Excellent opportunity for advancement in young organization. Qualifications required: graduate forester, with an interest in utilization and marketing and the ability to understand and work with people.

C. N. Nelson, State Forester, North Dakota Forest Service, Bottineau, North Dakota.

Positions Wanted

Forester, B.S. Forest Management, Colorado State. Age 33, married, 4 children. Experience: 11 yrs. varied experience with government and private industry including cruising (sale and inventory), fire protection, sales administration, appraisal, public relations. Past 4 years as company forester and logging superintendent for 12MM/yr. Eng. Sp. & Fir operation. Must relocate before school term in town with adequate schools and medical facilities. Prefer Rocky Mt. Region, but opportunity for advancement primary consideration.

Box A, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B. S. 1954, M. F. in Forest Management, 1959, New York State. Age 28, single, veteran. Experience: surveying, mapping, camp development and forest extension. Desire position in forest recreation, camp planning and development, or related fields.

Box B, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S., 1959, Louisiana State Univ. Age 22, married. Summer experience with U. S. Forest Service and research for Louisiana State Univ., School of Forestry. Desire work in woodland management or utilization.

Box C, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S.F. (minor in Soils) 5 years college, desires job in timber or land management. Initiative, loyalty, hard work, and sound technical knowledge. Experience: One year scaling and cruising in Oregon; 8 years operator of large dairy farm in Michigan; last three years in southern pine region in timber management work. Prefer cooler, less humid climate. Age 38, 4 children.

Box D, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S.F., 1951, W. Va. Married 3 children. Experience: 8 years forest management in southern pulpwood industry; 2 years manager of 25,000 management unit; extensive experience in timber marking, sales, hw control, mech. site improvement, road maintenance, timber and land classification. Desire position with private industry offering opportunity for advancement.

Box E, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S., 1957, Univ. of Maine. Age 28, married, one child. Presently employed as forester with federal agency in Pacific Northwest. Field experience includes inventory work, cruising, boundary determination, and timber appraisals. Desire position with opportunity for advancement with private industry. Will consider any geographic area, but northwestern or northeastern U. S. preferred.

Box F, Journal of Forestry, Mills Building, Washington 6, D. C.

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